

BEST VEHICLES THAT NEVER WERE

...or never had a chance to be.

This is a collection of vehicles and aircraft which were never more than prototypes, developmental vehicles, drawing-board designs that never made it off the drawing board, or are purely fictional. Some of the real proposals (as opposed to purely fictional ones) may yet make it into service one day, and others probably never will; others may make it into service, but not in quite their proposed forms. Only time will tell...

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Mitsubishi/Lockheed Martin F-3 Stealth Fighter

Country of Origin: US, though Lockheed Martin will at first design the F-3 with Japanese aid and eventually the F-3 would be produced in Japan locally.

Seen in: Recent aircraft publications.

Notes: Just about every aircraft enthusiast knows that, by law, the F-22 cannot be exported, due to its sensitive design and components. The Japanese stealth fighter design process, the F-X, has not been going well, and it has been running for about 10 years. Lockheed Martin therefore got US government permission to build and pitch to Japan a prototype stealth fighter – this would be designated by Japan the F-3, and would be a hybrid of the F-22 and F-35. This aircraft could possibly be the most advanced stealth fighter other than the F-22. The primary fighter-bomber of the JASDF is the F-15J, a variant of the F-15 Eagle, but the F-15J is getting long in the tooth, with some airframes approaching 40 years old, and the Japanese need to replace the older F-15Js, and they would like it to be a 5th-generation aircraft. The F-3 would also give Lockheed Martin a new exportable 5th generation fighter. (Japan's constitution prohibits exportation of military equipment.) The Japanese part of the design team would have a leg up, since Japan is a customer for the F-35 and have recently received their first batch. Unfortunately, both sides realize the design process would be lengthy; the first operational F-3 would probably not go into service until 2032 or so.

Though details are sketchy, most aircraft experts believe that the F-3 would look very much like the F-22 on the outside, with a hybrid of systems of the F-22 and F-35 on the inside. One of the biggest upgrades of the F-22/F-35's avionics architecture is the use of advanced computers; the F-22's computer architecture is actually based on Windows 95, and the F-35's computer architecture is based on Windows 8. The F-3 would have the F-22's twin engine design (perhaps with updated Japanese-built engines) and supermaneuverability, while being equipped with larger internal bays for weapons and hardpoints on the wings for extra weapons and electronic equipment in low-EW environments.

The F-3's avionics would be an updated mix of the F-22's and F-35's avionics, with a switchable air-to-air/air-to-ground capability, similar to the systems on the F/A-18 and F-15E. Most of the avionics would probably be based on the F-35, essentially putting the brain of an F-35 in the body of the F-22.

The F-3 will probably be somewhat larger than the F-22, and much larger than the F-35. The intake side bays will be larger, and the underside will be wide and flat to accommodate even more weapon storage or larger ordnance. Construction would utilize much carbon fiber, along with an unspecified RAM coating and RAM paint. Engines would probably be in the 40,000-pound-thrust class. Fuel tanks would be dramatically larger. We will assume for this entry that the troublesome AESA radar of the F-X would be perfected. The F-3 could be as stealthy as an F-22, negating the basic flaw in the F-25 – its stealth capabilities have proven disappointing. It will also have supercruise capability, something the F-35 does not, while maintaining the air-to-ground capabilities of the F-35. Another basic flaw in the F-35 (at least for Japan) is that the F-35's weapon bays are not large enough to allow carriage of most antiship missiles, while the F-3's larger weapon bays would make this possible.

A possible stumbling block to a possible F-3 is the RL cost – with the 70 F-3s the Japanese would likely buy, each copy would cost \$216 million. This would drop, however, if more F-3s were bought or there were good export sales. However, many aviation experts feel that the F-3, with its hybrid F-22/F-35 brain and near-F-22 body, could outclass both of them.

It should be known to the readers that the stats below are largely speculative, based on the F-22, F-35, and what descriptions so far released about the possible F-3.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$290,744,313	JP-7	32.36 tons	41.8 tons	1	30	AESA Radar (240 km), Sensor Skin (40 km), FLIR (150 km), VAS (70 km)	Shielded

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
5170	1438 (266)	NA 320 10/6 100/60	9020	8540	22000

Combat Equipment	Minimum Landing/Takeoff Zone	RF	Armament	Ammo
All Weather Flight, Secure Radios, HUD, HUD Interface, Helmet/Sight Interface, Look-Down Radar, Track While Scan, Auto Track, Multitarget (6), RWR, LWR, Flare/Chaff Dispensers (50/50), IR Uncage, Target ID, Stealth 6, IR Stealth 4, ECM 3 IRCM 4, ECCM 3, GPS, Supercruise	750/700m Hardened Runway	+5	20mm Vulcan, 5 Hardpoints, 4 Weapon Bays	250x20mm

F-16F Scamp

Country of Origin: United States

Type of Aircraft: Fighter/Bomber

Notes: Though based on a real experimental aircraft, this is a work of fiction. (There is, in fact, an F-16E and F-16F -- they are fairly

recent developments of the F-16 series. (*This F-16F is not the real-life F-16F.*)

Fictional Notes: This was originally an experimental development of the F-16C Fighting Falcon. These aircraft were produced to equip one USAF squadron of aircraft stationed in England, and it was this type of aircraft that the Twilight War's highest scoring ace, Captain Pamela Wagner, piloted to 49 kills before being shot down over Poland in 1999. The Scamp uses more powerful engine coupled with a large-area cranked arrow wing, and carries more electronics and fuel. The Scamp may be overloaded to 8.76 tons if 600 liters less fuel are carried per 450 kg extra weight carried. The aircraft has a large number of hardpoints, 2 of which may be used only for electronics pods, two of which may be used only for air-to-air missiles or electronics pods, and 6 of which may only be used for air-to-air missiles.

The F-16F Scamp does not exist in the Merc 2000 timeline.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$79,576,880	AvG	6.8 tons (see text)	21.77 tons	1	30	Radar, VAS	Shielded

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
5023	1256 (90)	NA 314 10/6 100/60	7440	960	19800

Combat Equipment	Minimum Landing/Takeoff Zone	RF	Armament	Ammo
All Weather Flight, HUD, Look-Down Radar, Track While Scan, Auto Track, Multitarget (4), Terrain Following Radar, Radar Warning Receiver, Flare/Chaff Dispensers (70/70), Stealth 1, ECM/ECCM 3, IRCM 2, IR Uncage, Target ID	750/480m Hardened Runway	+5	20mm Vulcan, 25 Hardpoints	500x20mm

F-19A Ghostrider

Country of Origin: United States

Type of Aircraft: Stealth Attack Aircraft

Notes: The first I heard of this "aircraft" was in the Tom Clancy book *Red Storm Rising*. His Ghostrider was based upon what the rumored capabilities of the F-117A Nighthawk were at the time (early 1980s), to include the designation "F-19A." (The moniker "Ghostrider" was Mr. Clancy's own invention.) Most of these rumored capabilities, as well of the appearance of the F-117A, were simply wrong. JD Webster's *Air Superiority* series of games fleshed out these rumored capabilities.

Fictional Notes: This stealth aircraft, rumored but rarely seen, is a second-generation stealth aircraft used by the US for reconnaissance and attack of highly defended targets. It was rarely flown from base to base for security reasons, but was often delivered to bases inside a C-5 Galaxy cargo aircraft. The aircraft has flat bottom, blended wings, advanced ECM, and construction of radar-absorbent materials. Weapons are carried in internal bays and do not contribute to drag. Unlike the F-117A, the F-19A has an air-to-air capability.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$135,195,700	AvG	2.95 tons	35 tons	1	36	Radar, Image Intensification, FLIR	Shielded

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
2108	527 (185)	NA 132 5/4 50/40	4800	8647	18300

Combat Equipment	Minimum Landing/Takeoff Zone	RF	Armament	Ammo
Radar Warning Receiver, Flare/Chaff Dispensers, ECM, Auto Track, HUD, IR Uncage, Look-Down Radar, Terrain Following Radar, Track While Scan, Target ID, Stealth 4, IR Stealth 3, ECM/ECCM 4, IRCM 2, Flares/Chaff (45/45)	1200/1500m Primitive Runway	+5	20mm Vulcan, 6 Weapon Bays	600x20mm

F-20 Tigershark

Notes: The F-20 Tigershark was conceived as a heavy modernization of the F-5E Tiger II, and became the ultimate evolution of that fighter. The idea was to provide, for countries unable to afford even relatively inexpensive fighters like the F-16 or unable to obtain them for political reasons, with a light, inexpensive fighter-bomber which, while it was not quite in the class as the F-16, could provide similar capabilities. With the improvements given to the F-20 over time, the Tigershark became competitive with its contemporaries, at a much lower cost of both purchase and upkeep. The Tigershark was in fact, almost bought by a number of countries, most notably Taiwan, Portugal, Mexico, Turkey and Bahrain, until the Reagan Administration stopped the sales, citing technology transfer concerns (and more importantly, political concerns), and essentially killed the Tigershark program. It is perhaps paradoxical, therefore, that the F-20 was originally conceived as a light dogfighter for US forces, and competed in the F-X program. In addition, the US Navy Fighter Weapons School (Top Gun) was seriously considering the F-20 for use as an OPFOR aircraft. Denoting its roots in the F-5E, the Tigershark was initially designated the F-5G. As Tom Martin, a noted military aircraft expert said, "the F-16 is a Ferrari, while the F-20 is more of a Ford Escort Sport with full options."

Design work began in 1975, and from the start included abilities like a modern avionics suite (for the time), a powerful radar with a wider sweep angle than most fighters of the time (including the F-16), and flexible and switchable air-to-air/air-to-ground modes, something at the time only the F/A-18 Hornet had. The Taiwanese (the big potential buyer at the time), wanted an aircraft able to fire the AIM-7 Sparrow (this was before the AIM-120 was in existence), and Northrop quickly designed this into the F-20, including BVR capability – at the time, this was a capability even the F-16 and F/A-18 did not have. The F-20 essentially became the fighter designed for Taiwanese needs; though they had their own fighter program in the AIDC F-CK-1 Ching-Kuo, their program was going poorly due to the inability to get key components. The F-20 were essentially almost a match for the F-16s that Lockheed was prohibited from selling to Taiwan, again due to political considerations. The typical pilot was able the full capabilities of the F-20 after only two days of training.

The primary aerodynamic change between the F-5E and the F-20 was the replacement of the twin GE J85s with a single GE F404 designed for the F/A-18 Hornet. (Originally, the F-20 was to be powered by the F-16's PW F100, but the Mean Time Between Failures of the PW F100 is 45 while for the GE F404 it is 90.) This engine, combined with the Tigershark's light weight, gave it 40% more thrust, and the Tigershark was able to reach Mach Two, a much higher ceiling, and a climb rate of 16100 meters per minute. The wings looked the same, but they were equipped with leading edge extensions, which greatly improved dogfighting capabilities, almost reaching those of the F-16, they also increased lift. The light weight was enhanced buy the use of fiberglass in some low-stress areas of the aircraft. The canopy was lengthened and bulged to provide better visibility, and the rear of the fuselage was lengthened and reshaped to accommodate the wider, longer, one-engine profile. The F-20 meets or exceeds the F-16 in scramble time, time to mission capable status at 12,000 meters, instantaneous and sustained turn rate, acceleration, range on internal tanks, and AAM use. It was, essentially, a better dogfighter capable of performing ground support missions than the F-16.

The radar was a greatly improved GE AN/APG-67 multimode radar, which was switchable by flipping only a few switches from an Air-to-Air to an Air-to-Ground optimization. The navigation was replaced with an inertial navigation system based on a ring laser gyro system, which increased scramble times to 22 seconds from ground park to takeoff condition. The cockpit used a large HUD and two monochrome MFDs, essentially an early version of a glass cockpit. Most aerodynamic and fighting controls were on two HOTAS (Hands-On Throttle and Stick) sticks on the center and left side of the cockpit. The F-20 was capable of using most of the common US weapons of the time, from AIM-7 AAMs to Mk 80 bombs and Paveway LGBs; in addition, it could carry a selection of foreign weapons, like equivalent British, French, and Taiwanese weapons. The prototype F-20s were armed with twin M39 20mm cannons in the nose, but projected production version would have been armed with Ford Aerospace Tigerclaw 20mm cannons, with a higher ROF and more ammunition carried. (Later, the Tigerclaw would be designated the M39A2; it is essentially an M39 with longer barrels, higher muzzle velocity, more range, and a wider selection of ammunition.) The Tigershark used a ring gyro gunsight, which was again better equipment than that of the early F-16.

The F-20 did have its problems, mostly brought about by its small size. Large loads, whether in size or weight, were limited to the F-20's outer wing hardpoints due to the positioning of the main wheels, and these hardpoints were limited in carried weight to 454 kilograms. A single fuselage hardpoint could carry a 2000-pound Mk 84 bomb or the equivalent smart bomb, or up to five Mk 82 500-pound bombs on an MER. The HARM, a new ordnance type at the time, could be carried on pylons normally used for AAMs. The F-20 could also carry special external fuel tanks which allowed for buddy refueling.

In the end, however, the F-20 had only three prototypes built, and Reagan-era machinations caused to Tigershark to be killed. In addition, Lockheed (and then, General Dynamics, which has since merged with Lockheed Martin) was always the darling of the US DoD. Which is a shame, as it would have given friendly nations a capability they could not otherwise afford. In addition, two of the prototypes crashed while doing high-G maneuvers, and the crashes were traced to mechanical failures. The production lines were closed in 1983.

Twilight 2000 Notes: production of this aircraft commenced shortly before the Twilight War to equip the air forces of many Third World and some First World countries (such as Taiwan). Production continued during the Twilight War, and many of these aircraft were sent to US Air National Guard units to quickly beef up numbers and replace combat losses. One notable mistake was the sale of a squadron's worth of Tigersharks to the Mexican Air Force before the war, to protect the US's southern flanks; these were later used against the US when Mexico invaded the US.

Aircraft	Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
F-5G-1	\$12,815,858	JP4, JP5	3.63 tons	11.92 tons	1	40	Radar (180 km detection, 80 km tracking/lock-on).	Enclosed
F-20 (Early)	\$20,590,364	JP4, JP5	3.63 tons	11.92 tons	1	41	Radar (180 km detection, 80 km tracking/lock-on).	Shielded
F-20 (Late)	\$28,363,928	JP4, JP5	3.63 tons	11.92 tons	1	42	Radar (180 km detection, 80 km	Shielded

tracking/lock-on).

Aircraft	Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
F-5G-1	9012	2503 (110)	NA 250 7/4 70/40	2563	4045	16764
F-20 (Early)	9012	2503 (110)	NA 250 7/4 70/40	2563	4045	16764
F-20 (Late)	9012	2503 (110)	NA 250 7/4 70/40	2563	4045	16764

Combat Equipment		Minimum Landing/Takeoff Zone	RF	Armament	Ammo
F-5G-1	IFF, HUD Interface, IR Uncage, Look-Down Radar, Target ID, Radar Warning Receiver, Flare/Chaff Dispensers (20/20), Transponder	488m/1280m Hardened Runway	+2	2x20mm M-39 Autocannons, 7 Hardpoints	560x20mm
F-20 (Early)	IFF, Auto Track, All Weather Flight, IR Uncage, Look-Down Radar, Target ID, Radar Warning Receiver, Flare/Chaff Dispensers (25/25), Inertial Navigation, ECM 1	488m/1280m Hardened Runway	+3	2x20mm M-39 Autocannons, 7 Hardpoints	560x20mm
F-20 (Late)	Auto Track, HUD Interface, All Weather Flight, IR Uncage, Look-Down Radar, Track While Scan, Target ID, Radar Warning Receiver, Flare/Chaff Dispensers (30/30), Inertial Navigation, ECM 1	488m/1280m Hardened Runway	+3	2x20mm M39A2 Autocannons, 7 Hardpoints	600x20mm

F-29 Wildcat II

Country of Origin: United States

Type of Aircraft: Fighter/Bomber

Note: Though based on a real experimental aircraft (the X-29), this is a work of fiction, something I made up myself. I based the capabilities partially on some air combat computer games, partially on a fictional aircraft developed (believe or not) on a toy aircraft made for the GI Joe series of toys, and partially on the projected capabilities of a combat version of such a design, and partially on real-life capabilities of the X-29.

Fictional Notes: (for Twilight 2000 Only) This was the result of a militarized experimental aircraft, the X-29. It is a radical design with wings swept sharply forward, a deliberately destabilized center of balance, and canards at the front. As the X-29 development program and its militarization were a bit further along when production was ordered, the F-29 has a bit more bells and whistles than the F-31, and more of them were built (about 40). Though some were sighted in the skies of Europe, most of them never made it out of North America, where they were one of the most dangerous adversaries of the Mexicans, Cubans, and Russians. They cannot quite match the maneuverability of the F-31, but are larger aircraft able to carry more stores and fuel.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$81,172,620	AvG	5.58 tons	23.38 tons	1	30	Radar, VAS	Enclosed

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
3840	960 (110)	NA 240 12/7 120/70	3160	6589	16764

Combat Equipment	Minimum Landing/Takeoff Zone	RF	Armament	Ammo
All Weather Flight, HUD Interface, Track While Scan, Auto Track, Multitarget (3), Radar Warning Receiver, Look-Down Radar, Flare/Chaff Dispensers (20), IR Uncage, Target ID, Laser Designator, Stealth 1, ECM/ECCM 2, IRCM 1, Flares/Chaff (30/30)	800/530m Hardened Runway	+5	20mm Vulcan Autocannon, 7 Hardpoints	720x20mm

F-31 Vector

Country of Origin: United States

Type of Aircraft: Air Superiority Fighter

Notes: Though based on a real experimental aircraft (the X-31), this is a work of fiction. The story of how I made up the F-31 is basically the same as that of the F-29, above.

Fictional Notes: (Twilight 2000 Only) This aircraft was developed as a war emergency measure from the X-31 EFM (Enhanced

Flight Maneuverability) prototypes that were flying at Edwards Air Force Base, California. The main attribute of the Vector is its ability to fly with stability at very high angles of attack, done with a combination of thrust vectoring, advanced fly-by-wire controls, and deliberate destabilization along with computer-aided controls. The result is an aircraft that very often outmaneuvers its pilot; occasional GLOC (G-induced Loss of Consciousness) is a factor that pilots of the Vector figure in when flying their aircraft in its most extreme maneuvers. It is one of only two aircraft with enough maneuverability to successfully execute the Herbst Angle of Attack maneuver (also known as the J-Turn), where the aircraft uses a deliberate sudden stall to radically change the aircraft's direction of flight without an accompanying reduction of engine power levels. It is also capable of flying at up to 75 degrees of angle of attack. The Vectors built after the order was given by the Department of Defense never made it out of North America during the Twilight War, but Mexican and Cuban pilots, and Russian pilots flying over Alaska were known to curse its very existence, as the F-31 eventually racked up a 28-to-1 kill ratio, a ratio that might have been higher were there more aircraft over North America to shoot down.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$68,219,760	AvG	3.86 tons	11.09 tons	1	21	Radar, VAS	Enclosed

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
3185	796 (110)	NA 199 14/7 140/70	2364	6769	12200

Combat Equipment	Minimum Landing/Takeoff Zone	RF	Armament	Ammo
All Weather Flight, HUD Interface, Track While Scan, Auto Track, Multitarget (2), Radar Warning Receiver, Flare/Chaff Dispensers, ECM, IR Uncage, Target ID, Laser Designator, Stealth 1, ECM/ECCM 2, IRCM 1, Flares/Chaff (30/30)	735/485m Hardened Runway	+4	20mm Vulcan, 7 Hardpoints	740x20mm

MiG-35 Falroth

Country of Manufacture: Russia/Soviet Union

Aircraft Type: Fighter/Bomber

Notes: Though based on a real experimental aircraft (the MiG 1.44), this treatment is a work of fiction (done by yours truly). Russia would dearly love to build a fighter based on the MiG 1.44, but may never have the money to do it.

Fictional Notes: This multirole fighter was rumored as early as the early 1990s, but its existence was not confirmed until the Twilight War. It is a twin-tailed "double-delta" design, with a large wing and canard foreplanes. It is a very advanced stealth design with good air-to-air and air-to-ground capabilities. The Falroth is 3 levels harder than normal to detect with radar or guide weapons to it with radar, and two levels harder to detect or guide weapons with radar. The internal weapon bay is normally taken up with air-to-air weapons, but it is large and can hold up to 1.5 tons. Unfortunately, development was long and expensive, and until just before the Twilight War, there were no plans to mass-produce the MiG-35; therefore, numbers of the MiG-35 were limited to less than 75 copies. Popular nicknames in the West were "ATFski" and "Raptor Killer."

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$148,320,320	AvG	5 tons	31.75 tons	1	32	Radar, FLIR, VAS	Shielded

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
7334*	1224 (110)	NA 306 11/7 110/70	6625	13317	17000

Combat Equipment	Minimum Landing/Takeoff Zone	RF	Armament	Ammo
All-Weather Flight, Radar Warning Receiver, Flare/Chaff Dispensers, ECM, Auto Track, HUD, IR Uncage, Look-Down Radar, Track while Scan, Active Jamming, Laser Designator, Target ID, Multitarget (4), Stealth 1, ECM/ECCM 2, IRCM 1, Flares/Chaff (40/30)	600/430m Hardened Runway	+4	30mm-3 Autocannon, 1 Weapon Bay, 8 hardpoints	330x30mm

*The MiG-35 is supercruise-capable.

MiG-37 Ferret

Country of Manufacture: Russia/Soviet Union

Aircraft Type: Stealth Attack Aircraft

Notes: Though there have long been rumors of a "Russian Stealth Fighter," the "MiG-37 Ferret" I used to come up with these statistics was actually the product of the imaginations of designers at Revell, a manufacturer of model airplanes.

Fictional Notes: The MiG-37's existence was not confirmed until the Twilight War, though there were rumors of overflights in China, Alaska, and the Middle East as early as 1992. It is a first-generation stealth aircraft, as the US F-117A. The aircraft's fuselage, like the F-117, is composed of facets designed to reflect radar away instead of back to its source. The exhaust is cooled through a thermal

brick system and by auxiliary inlets in the rear. The Ferret uses weapon bays that do not expose its weapons to radar emissions. This aircraft is a bit larger and more powerful than the F-117A, and it is possible that spies got information from the Nighthawk program. It was never known how many of these aircraft the Russians had, since they were used only against high-value targets and taken from base to base in An-124 Condor aircraft. They were rarely encountered during the Twilight War, however, and mostly used for reconnaissance. Unlike the F-117A, the Ferret does have an air-to-air capability.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$87,085,010	AvG	2.2 tons	23.99 tons	1	36	FLIR, Radar	Shielded

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
2668	667 (140)	NA 167 4/2 40/20	4500	5374	17000

Combat Equipment	Minimum Landing/Takeoff Zone	RF	Armament	Ammo
Radar Warning Receiver, Flare/Chaff Dispensers, ECM, IRCM, HUD, Look-Down Radar, Terrain-Following Radar, Stealth 3, IR Stealth 2, ECM/ECCM 2, IRCM 2, Flares/Chaff (40/30)	1300/1600m Primitive Runway	+4	30mm Autocannon, 4 Weapons Bays	400x30mm

R-5D

Country of Origin: United States

Type of Aircraft: Multirole Stealth Aircraft

Notes: This is a work of fiction, as far as I know...It is based on the various rumors of the Aurora's capabilities.

Fictional Notes: (Twilight 2000) This hypersonic fighter/reconnaissance aircraft was rumored for over a decade before the Twilight War, but its existence was not confirmed until many years after it. Known by many designations and names over the years, such as Senior Citizen, Senior Trend, Senior Ice, Grandfather, XR-7, Darkstar Mike, Darkstar November, and SR-91; but perhaps the name it was known to the most people was "Aurora." It never officially had any assigned name, and even the designation R-5D was simply made up in order to call the aircraft something. The R-5D was high-speed scramjet-powered aircraft primarily designed for long-range strategic reconnaissance, but also with a limited role as an interceptor and air interdiction vehicle; details are still sketchy, but R-5D aircraft are believed to be responsible for several mysterious aerial intercepts of aircraft over Russia and the Middle East, including the shoot-downs of the aircraft of the Russian President in 1999, mysterious downings of almost a dozen enemy AWACS aircraft in critical areas, and the "Nuclear Warhead From Nowhere" that destroyed the North Korean 22nd Tank Division while located near the Chinese border in 1997. Due to an experimental light-absorbing paint job, it is even one level harder to detect by visual means. However, the R-5D is known to make a distinctive double-bang noise when it is in the vicinity, and this sound is 50% likely to be heard when the R-5D is within 50 kilometers. Though it takes very specific atmospheric conditions, R-5D are also known to leave a distinctive "doughnuts-on-a-rope" contrail, a set of contrail rings connected by a slim, though conventional contrail. Though the R-5D could burn regular jet fuel, best performance was achieved on a liquid hydrogen/methane mix, and speed is limited to one half the values below unless the special fuel is used. The only external hardpoints are for drop tanks; if these tanks are carried, all speeds are limited to one-half the maximum speeds, and stealth efficacy is reduced by two levels. The remaining stores are kept in weapons bays. It is not believed that any R-5Ds were shot down, though 2 were lost in accidents before the war; a total of 6 are known for sure to have been built, though there may have been as many as twice this number in existence.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$230,280,040	JP7 or H/M	3.83 tons	32.5 tons	2	80	Radar, LIDAR, FLIR, VAS	Shielded

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
(H/M) 6600, (JP7) 3300	(H/M) 1650, (JP7) 825 (175)	NA (H/M) 413/(JP7) 207 5/4 50/40	20400	(H/M) 23520, (JP7) 47040	40000

Combat Equipment	Minimum Landing/Takeoff Zone	RF	Armament	Ammo
Radar Warning Receiver, Flare/Chaff Dispensers, HUD Interface, IR Uncage, Look-Down Radar, Auto Track, Track While Scan, Target ID, Stealth 3, IR Stealth 2, ECM/ECCM 4, IRCM 3, Flares/Chaff (100/100), All-Weather Flight, Satcom Radio, Secure Radios, Deception Jamming, Laser Designator, ELINT Gear	2800/1500m Hardened Runway	+5	2 Hardpoints (Drop Tanks Only), 6 Weapon Bays	None

Su-47 Flatfoot

Country of Manufacture: Russia/Soviet Union

Aircraft Type: Fighter/Bomber

Note: Though based on a real experimental aircraft (the S-37 Berkut), this treatment is a work of fiction. Whether or not the Russians will ever have the money to take the Berkut out of what is basically an advanced prototype stage is anybody's guess, though they have already assigned the designation "Su-47" to any possible future production version, and Sukhoi is reportedly working hard to come up with the money to make a production version a reality.

Fictional Notes: Known to the Russians as the Berkut (Golden Eagle), the Su-47 was a mysterious aircraft until late in the Twilight War, with isolated sightings being made here and there in encounters that were usually to the detriment of NATO or Coalition pilots. Mostly employed in Europe, some Berkuts were encountered in the Middle East, and there were even a few reported over Alaska and western Canada. Estimates of the total number available to the Russians range from about 10 to over 25. Captain Pamela Wagner, the Twilight War's highest-scoring ace, claims that a tangle with a Berkut led to her being downed over Poland in August of 1999. The Berkut is a radical design that draws from stolen data on the X-29 program in the US, using composite construction, swept forward wings, and an unstable configuration controlled by computers. The Su-47 has an internal weapon bay that can carry 1.5 tons. The fuselage is a modified Su-37 Flanker series, and thrust vectoring has been added to the exhaust. The Berkut has a RAM (Radar-Absorbent Material) coating to its fuselage that gives a one level detriment to attempts to detect or guide radar weapons to it. Avionics are perhaps the most advanced of any applied to a Russian fighter. The Su-47 has been reported flying in angles of attack of up to 70 degrees, and is capable of extremely difficult maneuvers such as Pougachev's Cobra and the Herbst Angle of Attack Maneuver. All in all, the Su-47 was a fighter much dreaded by Western pilots, and thankfully, not often seen. The four conformal underfuselage hardpoints may only be used for air-to-air missiles; the two on the wingtips may only be used for air-to-air missiles or electronics pods.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$153,578,640	AvG	8 tons	34 tons	1	48	Radar, FLIR, VAS	Enclosed

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
4976	1244 (110)	NA 311 13/8 130/80	13860	14666	18000

Combat Equipment	Minimum Landing/Takeoff Zone	RF	Armament	Ammo
All-Weather Flight, Radar Warning Receiver, Flare/Chaff Dispensers (20), ECM, Auto Track, HUD Interface, Look-Down Radar, IR Uncage, Track While Scan, Secure Radios, Multitarget (6), Target ID, IR Suppression, Stealth 2, ECM 2, IR Stealth 1, VG Nozzles, Active Jamming	1200/750m Hardened Runway	+4	GSh-301 30mm-3 Autocannon, 1 Weapon Bay, 14 Hardpoints	150x30mm

Avro Bobcat

Country of Origin: Canada

Seen in: Canadian attempts to build a domestic family of vehicles

Notes: Post World War 2, many countries were developing full-tracked enclosed APCs, sometimes from surplus wartime vehicles or vehicles based on an improved version of those designs. In Canada in the 1950s, this vehicle was typified by the Bobcat. While the Canadian Army during World War 2 had experimented with open-topped versions of the M7 and 25-pounder Sexton-based APCs, after the war they wanted a close-topped design. Shortages of funds led to a somewhat deficient design, with not much headspace for the troops inside. However, the Bobcat was in service until 1963, when they were replaced by the M113, and later, the M114.

Initially, the Bobcat was to be a family of vehicles, including mortar carrier, ambulance, LRT (Light Reconnaissance Tank, which would mount a British Saladin turret), and an IFV, with a small turret mounting a heavy and light machinegun coaxial to one another. However, after some budgeting work was done, only APC prototypes was built. Many wanted to switch to the M113 as soon as it was available, as the Bobcat had a number of quirks that made it inferior to the M113, while offering a bigger commander's machinegun and superior protection.

The Bobcat was armed with a single M1919A4 machinegun in a low turret, manually-rotating. The Bobcat had a good engine, an early version of what would later power the M113 (a 280-horsepower gasoline engine). The original Bobcats were made of aluminum, but aluminum fabrication were not what they later would be, and the aluminum plates kept cracking, so they were switched to all-welded steel; welding large areas was also not as technologically sound as it would later be, and the Canadians switched to bolts. The Bobcat had a nasty tendency to throw tracks, even in mild turns, necessitating a redesign of the roadwheels and sprockets. The transmission was balky and noisy. There was no room up front for drive gear, so the drive sprocket and gear was moved to the rear. Those, and other problems, meant that the Bobcat was growing more and more expensive (in RL terms), and when the M113 was ready for export, the Canadians jumped on it, as the RL unit cost was much less for an M113 than a Bobcat, and did not have the problems the Bobcat had.

The engine was at the front with the commander's turret on the right side and the driver's position on the left. The glacis was almost vertical; more slope would have left less space for the engine and necessitating a lengthening, but would ballistically superior. The glacis was in fact, canted forward to a great degree. It was a fairly small vehicle, but carried 8 troops in individual seats with a low overhead, and much crouching necessary to exit the large rear door. The troops had seats which could be moved up, allowing the troops in the rear to put their heads outside the vehicle for observation or to fire weapons outside the vehicle.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$55,385	G, A	900 kg	17 tons	2+8	12	Active IR (D)	Enclosed

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
123/86	34/24/3	320	125	CiH	T2	TF2 TS2 TR2 HF4 HS3 HR3

Fire Control	Stabilization	Armament	Ammunition
+1	Fair	M1919A4 (C)	1000x.30-06

BAE/Hagglunds Warrior 2000

Country of Origin: Britain (with Swedish and Finnish Cooperation)

Seen In: BAE Company literature and at world arms shows.

Notes: The Warrior 2000 was developed for the Swiss competition for a new IFV. (It lost in this competition to the CV-9030.) BAe then hoped to shop it around the world, but there were also no takers; the British MOD then gave it a no-go, as they had pitched head first into the FRES program. As the FRES program had to be continually rebooted as it went south (it is still steaming along, however), the British Army realized, especially after it's experiences in Op Telic, that the standard Warrior or even the Desert Warrior were not quite up to realities of modern warfare, and who knows when the FRES program will yield any operational results? The British Army looked at the Warrior 2000 again – It too was not quite what the British Army wanted, but it better than anything else on the horizon. Now, to convince the MoD...

The Warrior 2000 incorporated a new concept to armored vehicles (though, of course, it is not a new concept) – a partial stealth treatment. The shaping of the turret is more lozenge-shaped (though it is based on that of the LAV-25, up-armored and heavily-modified), the glacis more angled with a further angled (in the opposite direction) underside to the glacis, slightly sloped sides, and a slightly sloped (to the rear) face. The Warrior 2000 is actually 230 millimeters longer and 14 millimeters shorter in height than the standard Warrior. The TOW launchers, one on each side of the turret, are also shaped to blend into the profile of the turret. The engine exhaust, air conditioner exhaust, and NBC exhaust are cooled by as-yet unnamed technology. In addition, there are coatings at several points on the hull; under IR, image intensification, thermal imaging, and FLIR, the Warrior 2000 doesn't look much like a vehicle, and someone trying to spot the Warrior 2000 is one level less likely to do so, and two levels less likely to identify it as an armored vehicle. Radar searches are also one level less likely to be less effective. The engine is installed such as to dampen noise, and the new double-pin track is also much quieter.

In addition to the TOW launchers (one on each side of the turret), firepower has been increased by replacing the 30mm Rarden with a rapid-firing 20mm Mk44 Bushmaster II Chain Gun. The L94A1 7.62mm Chain gun has been retained (though when

demonstrated to the Swiss, the Warrior 2000 demonstrator was fitted with a 7.5mm conventional machinegun). All three weapons have to-axis stabilization, and the weapons are linked to an advanced FC computer, and a laser rangefinder which can double as a designator. The gunner has separate handles and triggers for the main gun and the machinegun, while the commander, who can take over either the main gun or coaxial gun, has one handle and trigger with a selector. An interlock prevents the commander and gunner from firing the same weapon at the same time, with the commander having priority. The gunner and commander can engage helicopters and UAVs as well. Though a different system of the FC computer is used. On each side of the turret, under metal shrouding, are four smoke grenade launchers.

The Warrior 2000 comes standard with a BMS and vehicle state computer, along with a comprehensive land navigation system. It has a fire/explosion dampening system which is separate for the engine, transmission, fuel cells, ammunition compartments, turret, and driver's compartment. The Warrior 2000 is equipped with an air conditioner and heater, as well as an NBC Overpressure system which is linked to the air conditioner intake, allowing the air conditioner to operate in NBC environments. The infantry squad leader has a roof-mounted cupola which also has a vision block that is equipped with an image intensifier. He also has an LCD screen which provides him with needed tactical information about the immediate battle situation. The squad leader can also tap into the turret's thermal imager (though he has no control over its orientation), the backup camera, or

The engine is the same, but is uprated to 750 horsepower and has a modified fully automatic transmission to match the new power ratios. The transmission has a manual backup, but driving with this backup transmission is described as "rather fatiguing." Some sources indicate that the 750 horsepower engine of some of the previous upgrades is being considered to power the Warrior 2000. Cage armor is not being considered, as it would spoil the stealth shape, but specially-shaped applique *is* being considered. Armor is increased, and includes some "special materials" to enhance stealth. Large stealth-shaped lockers extend halfway up the sides for crew equipment, and the fuel cells have been moved to each side of the ramp and faired to blend into the stealth profile.

In 2001, a version of the Warrior 2000 was demonstrated topped with BAE/Hagglunds E30, for trials in Finland. (The Warrior 2000 in this guise was not chosen by the Finnish, though BAE/Hagglunds did later win the contract to supply the E30 turret for use on the CV9030 used by Finland, Norway, and Switzerland. The primary change in the operation is the change in the size, shape, and electric drive of the turret. However, the FC Computers are separate for each weapon, and have a fully digitized open electronic architecture, in which the software is relatively simple to upgrade; this is particularly, since all three parties indicated they might want to change to a 40mm autocannon in the future, and incorporate other software and sensor updates. Another major difference is the use of an M2HB as a coaxial machinegun instead of a 7.62mm-based weapon, which could also be used as an aiming aid should the FC computer fail. Though Warriors with the E30 turret were not produced, I have included them for comparison. I have also presumed that any such Warrior 2000s would include a "stealth shell" over the body of the turret.

All Warrior 2000s are capable of mounting specially-shaped spaced applique or MEXAS applique armor. They also have bolt holes covered with plastic caps for the mounting of cage armor or ERA.. But the lugs themselves (or the ERA) are not normally mounted – again, it would spoil the stealth shape.

Vehicle	Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
Warrior 2000 (750 hp)	\$1,162,170	D, A	1.12 tons	31.6 tons	3+7	25	Thermal Imaging (G, C), Passive IR (D, G, C), Image Intensification (G, C)	Shielded
Warrior 2000 (750 hp, Standard Applique)	\$1,197,033	D, A	1.09 tons	32.55 tons	3+7	21	Thermal Imaging (G, C), Passive IR (D, G, C), Image Intensification (G, C)	Shielded
Warrior 2000 (750 hp, MEXAS Applique)	\$2,178,619	D, A	1.06 tons	31.7 tons	3+7	25	Thermal Imaging (G, C), Passive IR (D, G, C), Image Intensification (G, C)	Shielded
Warrior 2000 (750 hp, E30 Turret)	\$1,360,395	D, A	1.37 tons	31.3 tons	3+7	26	FLIR (G, C), Passive IR (D, G, C), Image Intensification (G, C)	Shielded
Warrior 2000 (750 hp, Standard Applique, E30 Turret)	\$1,363,527	D, A	1.15 tons	32.2 tons	3+7	27	FLIR (G, C), Passive IR (D, G, C), Image Intensification (G, C)	Shielded
Warrior 2000 (750 hp, MEXAS Applique, E30 Turret)	\$2,355,113	D, A	1.18 tons	32.07 tons	3+7	27	FLIR (G, C), Passive IR (D, G, C), Image Intensification (G, C)	Shielded
Warrior 2000 (750 hp, E30)	\$1,389,966	D, A	1.08 tons	33.48 tons	3+7	31	FLIR (G, C), Passive IR (D, G, C), Image Intensification (G,	Shielded

Turret, CT-40 Gun)								C)	
Warrior 2000 (750 hp, Standard Applique, E30 Turret, CT-40 Gun)	\$1,395,036	D, A	1.05 tons	34.38 tons	3+7	31	FLIR (G, C), Passive IR (D, G, C), Image Intensification (G, C)	Shielded	
Warrior 2000 (750 hp, MEXAS Applique, E30 Turret, CT-40 Gun)	\$2,386,622	D, A	1.05 tons	34.25 tons	3+7	29	FLIR (G, C), Passive IR (D, G, C), Image Intensification (G, C)	Shielded	

Vehicle	Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
Warrior 2000 (650 hp)	136/114	34/21	770	290	Trtd	T4	TF12Sp TS8Sp TR5Sp HF17Sp HS10Sp HR5*
Warrior 2000 (650 hp, Standard Applique)	134/112	33/21	770	294	Trtd	T4	TF12Sp TS8Sp TR5Sp HS24Sp HS16Sp HR8**
Warrior 2000 (650 hp, MEXAS Applique)	136/114	34/21	770	290	Trtd	T4	TF12Cp TS8Cp TR5Sp HF24Cp HS18Cp HR8**
Warrior 2000 (750 hp)	154/129	38/23	770	328	Trtd	T4	TF12Sp TS8Sp TR5Sp HF17Sp HS10Sp HR5*
Warrior 2000 (750 hp, Standard Applique)	152/127	37/23	770	333	Trtd	T4	TF12Sp TS8Sp TR5Sp HS24Sp HS16Sp HR8**
Warrior 2000 (750 hp, MEXAS Applique)	152/129	38/24	770	324	Trtd	T4	TF12Cp TS8Cp TR5Sp HF24Cp HS18Cp HR8**
Warrior 2000 (750 hp, E30 Turret)	155/129	38/24	770	325	Trtd	T4	TF17Cp TS10Sp TR7 HF17Sp HS10Sp HR5*
Warrior 2000 (750 hp, Standard Applique, E30 Turret)	151/126	37/23	770	334	Trtd	T4	TF17Cp TS10Sp TR7 HS24Sp HS16Sp HR8***
Warrior 2000 (750 hp, MEXAS Applique, E30 Turret)	152/127	37/23	770	333	Trtd	T4	TF18Cp TS11Cp TR7Sp HF24Cp HS18Cp HR8***
Warrior 2000 (750 hp, E30 Turret, CT-40 Gun)	149/126	37/23	770	336	Trtd	T4	TF17Cp TS10Sp TR7 HF17Sp HS10Sp HR5*
Warrior 2000 (750 hp, Standard Applique, E30 Turret, CT-40 Gun)	145/123	36/22	770	345	Trtd	T4	TF12Sp TS8Sp TR5Sp HS24Sp HS16Sp HR8**
Warrior 2000 (750 hp, MEXAS Applique, E30 Turret, CT-40 Gun)	146/124	36/22	770	344	Trtd	T4	TF18Cp TS11Cp TR7Sp HF24Cp HS18Cp HR8**

Vehicle	Fire Control	Stabilization	Armament	Ammunition
Warrior 2000 (Most)	+4	Good	30mm Mk 44 Bushmaster II, L94A1, L7A2 (C), 2xTOW II Launchers	525x30mm, 1920x7.62mm, 7xTOW II ATGM
Warrior 2000 (E30 Turret, Uppgunned)	+4	Good	40mm CT-40 autocannon, M2HB, 2xTOW II Launchers	500x40mm CTA, 1800x .50, 7xTOW II

*Hull floor armor for this version is 7Sp; turret roof armor is 5. The spaced armor of the hull sides and hull front is of a special composition and stops 4D6 instead of 2D6 from HE-type rounds; from AP and KE-type rounds, it stops 2D6.

**Hull floor armor for this version is 8Sp; turret roof and hull roof armor is 5. The front half of the turret's roof AV is 5Cp.

BMD Weapons Carrier

Country or Origin Russia (Soviet Union)

Real World/Merc 2000 Notes: This vehicle does not exist in real life; it was made up by the good people at GDW. In *Merc 2000*, the conditions that led to its creation did not exist.

Twilight 2000 Notes: The BMD Weapons Carrier is the same vehicle as the BMD-1 but with the turret removed. Two AGS-17 grenade launchers are on either side of the space where the turret used to be, and two PK machinegun mounts have been fitted, one on the bow firing forward and another on the rear deck firing to the rear. The driver's hatch is still on the front deck, and the place where the turret was is now open-topped.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$87,657	D, A	1 ton	8.5 tons	4+6	6	Active/Passive IR	Enclosed

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
181/127	40/25/5	300	89	Std	T4	HF8 HS4 HR4

Fire Control	Stabilization	Armament	Ammunition
None	None	2xAGS-17, 2xPKT	180x30mm Grenades, 2000x7.62mm

BMP-40

Country of Origin: Poland

Notes: As of 2008, this is still being shopped around and is not in production or service.

Twilight 2000 Notes: The BMP-40 was a rushed project of the Polish military in 1997 to produce an armored personnel carrier that could be used for a multitude of tasks (air defense, personnel escort, etc.). The basic frame was patterned on the BMP-1, which the Polish military had quantities of to examine and use as a test bed for the BMP-40. The primary cannon was copied from the Swedish CV 9040 vehicle. Because it uses the Swedish 40mm cannon the turret is a larger model than seen on the BMP-1; as such, the overall troop capacity is reduced from 8 to 6. Wartime models were seen with mounts using AGS-17 grenade launchers and/or AT-5 Spandrel ATGM weapons. The Steel Works of Stalow Wola was the primary manufacturer of this design, and allied air bombing of this facility hurt production of the BMP-40. As such only some 70 models are known to have been produced prior to the November nuclear strikes. Some models are reported to have been equipped with lugs for explosive reactive armor (TF, TS, HF, HS), and some have been equipped with appliqué armor similar to that of other BMP models. The ammunition for the 40mm gun was patterned after the 40mm Swedish ammunition, but was often difficult to obtain during the war amidst other Pact vehicles.

Merc 2000 Notes: This vehicle does not exist.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$276,465	D, G, AvG, A	1.5 tons	15.4 tons	3+6	7	Passive IR, Image Intensification (for gunner)	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
99/69	20/15/2	460	97	Trtd	T2	TF6 TS5 TR5 HF8 HS4 HR4

Fire Control	Stabilization	Armament	Ammunition
+1	Good	40mm Polish autocannon, AT-5 launcher, PKT, AGS-17 (C)	230x40mm, 6xAT-5 ATGM, 2000x7.62L, 200x30mm grenades

BWP-2000

Country of Origin: Poland

Notes: The BWP-2000 is a heavily armed IFV based on an MT-S tracked prime mover chassis and an Italian-designed turret and an autocannon of Israeli design. The hull and turret are all-welded, with no rivets to pop loose when the vehicle is hit. Lugs for ERA are fitted to the HF, HS, TF, and TS. The driver is at the front left, and the commander and gunner have hatches on the turret roof. Image intensification is provided for the commander, thermal imaging for the gunner, and passive IR for the driver. The commander also has a monitor to his front to see what the gunner sees in his thermal sight. TOW II missiles were obtained from Italy and copied, then fitted to the turret, which is a modified form of the turret mounted on the VCC-80 IFV. The rear of the vehicle has a power ramp with a hatch in it, and there are two large circular hatches in the troop compartment roof. Two firing ports are on each side of the vehicle. As of 2000, this vehicle is still a prototype and there are no plans to produce it.

Twilight 2000 Notes: This vehicle does not exist.

Merc 2000 Notes: This vehicle does not exist.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$406,742	D, A	1.5 tons	29 tons	3+8	12	Passive IR, Image Intensification, Thermal Imaging	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
84/59	20/15/2	705	143	Trtd	T4	TF22 TS8 TR6 HF27 HS10 HR8

Fire Control	Stabilization	Armament	Ammunition
+4	Good	60mm HVMS, 2xTOW II Launchers, PKT	180x60mm, 4xTOW II ATGM, 2000x7.62N

Cobra

Country of Origin: Belgium

Notes: This small tracked APC was not adopted by any country, but I included it here as a “what-if.” It is similar in concept to carriers such as the M-113, being a “bare box” sort of APC. It does have some interesting features, such as the positions for two drivers in the front hull to help relieve driver fatigue. They both have a bow-mounted machinegun to fire when they are not driving. In addition, there are three launchers on each side of the glacis for Mekar rifle grenades; these are not usable for direct fire, but may be launched in the indirect fire mode. The vehicle has a small turret on top mounting an M-2HB machinegun and twin 101mm rocket launchers. There is a hatch in the roof to the rear of the turret for reloading the rocket launchers. The interior is very cramped, especially when carrying a full complement of infantrymen. The infantrymen enter through a door in the rear of the hull.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$132,270	D, A	800 kg	6.5 tons	3+9	4	Passive IR	Enclosed

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
153/107	36/25/4	260	48	CiH	T2	HF3 HS2 HR2

Fire Control	Stabilization	Armament	Ammunition
+1	None	M-2HB, 2x101mm Rocket Launchers, 6xRifle Grenade Launchers (Bow), 2xMAG (Bow)	500x.50, 4x101mm Rockets, 12xMekar Rifle Grenades, 500x7.62mm

Experimental Bradleys

Country of Origin: United States

Notes: Almost on the heels of the introduction of the Bradley, studies began to upgrade the firepower of the Bradley. These studies were based on what the perceived opposition on the European battlefield would be at the time – and the belief that the BMP series was more heavily protected than was actually true. (It turned out that the 25mm M-242 ChainGun, especially with advancements in ammunition technology in the intervening years, would prove to be much more effective than thought – Desert Storm and Iraq have showed that the M-242 is actually a pretty effective weapon, even against some tanks and fortifications.)

One of the first of these experimental up-gunned vehicles was based on the M-2 Bradley, under the CVASt (Combat Vehicle Armament System Technology) program. A 35mm ARES Talon autocannon (originally designed for the Eagle air defense system, but with new ammunition, adapted for armored vehicles) was installed in a new cleft turret; this essentially split the turret into two parts, with the commander on the left side and the gunner on the right. The cleft turret was used to get around what would otherwise be an unacceptable rise in the height of the already-tall Bradley profile. The cleft turret also allowed the M-2 CVASt to lower the height of the vehicle by over half a meter, making it short enough to be air-transported in a C-130 aircraft. The cleft turret was additionally better-protected than a standard Bradley turret, and had wedge-shaped sides all around the turret. The interior was designed to minimize the vulnerability of the turret crew (in particular, in the case of a turret penetration on one side of the turret). The TOW box was modified to allow it to be used with the wedge-shaped side; it was in the same position as a standard Bradley, on the right side, but it did not pivot up and down except for loading (and pivoted only 45 degrees for loading). The fire control systems were essentially the same as those on a standard M-2 Bradley, but better-stabilized. The hull of the M-2 CVASt was essentially unchanged, except for minimal modifications necessary to mount the new turret. The M-2 CVASt proved to be an excellent vehicle that the testing crews raved about, but Pentagon interest had already moved on to a new autocannon using newly-developed CTA (Case-Telescoped Ammunition) under the COMVAT program (see below).

The COMVAT (Combat Vehicle Armament Technology) program was also based primarily on the chassis of the M-2 (though a few used the M-2A1 chassis), but unlike the CVASt turret, the COMVAT turret was a partially-modified version of the standard Bradley turret instead of a new turret. The COMVAT turret modifications centered around the new main gun, which used new CTA (Case-Telescoped Ammunition). The COMVAT's CTA (developed by ARES) uses a payload assembly that is seated entirely within the cartridge case; when the round is fired, a small booster charge is first ignited to propel the payload assembly a short ways into the gun barrel, at which point a combustible-case main propellant charge did the main work of sending the round to the target. A CTA cartridge is therefore lighter and more compact than standard ammunition, allowing a vehicle to carry more rounds for its main gun. The gun, also designed by ARES, uses a rotating breech, simplifies the gun's mechanism, making it more reliable and increasing the cyclic rate of fire (though not enough to increase the ROF by the *Twilight 2000 v2.2* rules; the ROF would end up to be about 6). The initial CTA gun used 30mm ammunition, but this was quickly up-gunned to 45mm, and later a gun that could be switched between 45mm and 60mm with a barrel change and the change of a few other parts. A few versions of Bradley COMVATs were also tested with casemate turrets, with the commander and gunner seated inside the vehicle behind the gunner. In the end, the primary stumbling block seem to have been the lack of desire on the part of the Army's supply system to introduce a new family of ammunition, and the Pentagon's lack of desire to pay for it. However, rumors are that the gun is still being experimented with.

Some less drastic firepower upgrades were also proposed, using larger versions of the M-242 Bushmaster ChainGun already used on the Bradley. Most of the experiments with these up-gunned Bradleys were based on the M-2A2 chassis and turret. The 30mm Bushmaster II weighs little more than the M-242 and can be installed in a Bradley turret with almost no modification. Though not tested, the 35mm Bushmaster III, the 40mm Bushmaster IV, and the 50mm Bushmaster SuperShot were also proposed for the Bradley. All but the 30mm gun would have required a great degree of turret and vehicle modifications – not because of the gun itself,

but to with the increased need for ammunition stowage and the increased weight of this stowage and the ammunition itself. The proposals for up-gunning the Bradley using these ChainGuns were rejected not only on a cost basis, but due to experience in Desert Storm and Iraq that showed the M-242 was more effective than previously thought.

Vehicle	Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
M-2 CVASt	\$283,093	D, A	1.7 tons	23.7 tons	3+6	8	Passive IR (D), Thermal Imaging (G+C)	Shielded
M-2 COMVAT 1	\$282,366	D, A	1.7 tons	23.3 tons	3+7	8	Passive IR (D), Thermal Imaging (G+C)	Shielded
M-2 COMVAT 2	\$287,760	D, A	1.6 tons	26.2 tons	3+7	8	Passive IR (D), Thermal Imaging (G+C)	Shielded

Vehicle	Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor*
M-2 CVASt	130/97	27/22/3	746	134	Trtd	T4	TF6 TS6 TR4 HF8 HS4Sp HR4
M-2 COMVAT 1	131/98	28/22/3	746	132	Trtd	T4	TF6 TS6 TR4 HF8 HS4Sp HR4
M-2 COMVAT 2	124/93	26/21/3	746	139	Trtd	T4	TF6 TS6 TR4 HF8 HS4Sp HR4

Vehicle	Fire Control	Stabilization	Armament	Ammunition
M-2 CVASt	+1	Fair	35mm ARES CTA, M-240C, 2xTOW II Launchers, 6xM-231 PFW	700x35mm, 2200x7.62mm, 7xTOW II, 3070x5.56mm
M-2 COMVAT 1	+2	Fair	30mm ARES CTA, M-240C, 2xTOW II Launchers, 2xM-231 PFW	825x30mm, 2200x7.62mm, 7xTOW II, 3070x5.56mm
M-2 COMVAT 2	+2	Fair	45mm ARES CTA, M-240C, 2xTOW II Launchers, 2xM-231 PFW	550x45mm, 2200x7.62mm, 7xTOW II, 3070x5.56mm

*Floor armor for these vehicles is 5.

Landmaster

Country of Origin: United States

Notes: This is the vehicle featured in the movie *Damnation Alley*, but there is no real vehicle except for Hollywood wizardry.

Twilight 2000 Notes: Designed for survival in the most hostile of elements, the Landmaster was a limited-production vehicle designed by USAF Missile Command in late 1998 using locally available components. The base chassis is a heavy truck, and the Landmaster uses a unique "trinary" wheel suspension. Each of the axles is connected to a pair of three roadwheel sets, with two of the set touching the ground. As the front-most wheel of the set contacts an insurmountable obstacle, it flips to the rear and over the obstacle, therefore bypassing it. This leads to high off-road speeds for a vehicle of its size, and the ability to overcome a vertical obstacle of over 1 meter in size.

The Landmaster is equipped with a dual control system, much like an airplane cabin. Control of the vehicle may be made by one or both of these controls, depending on the requirements of the terrain and weather. The vehicle is equipped with at least three military and one civilian "CB" radio. The vehicle is equipped with night vision for the forward cabin and the gunner's position. The Landmaster is equipped with both ground surveillance and ground-to-air radar. There is an external video camera and a shotgun microphone, as well as a PA system. The video equipment can use the night vision gear. The vehicle has a complete navigation suite, from simple downloadable computerized maps to inertial navigation and GPS. There are bunks for half the crew to sleep in at once, a small galley, a large refrigerator and freezer, an internal latrine, and a shower, fed by a 400-liter water tank. Also included are a water filtration system for decontaminating and desalinating local water, the equivalent of three doctor's medical bags, and a complete set of tools, including an air compressor and a welding and cutting set.

The Landmaster has a large hatch in the front and rear deck, hatches on either side of the forward cabin, and a large hatch in the rear. The rockets used in the forward rocket launchers are the same as used in the M-67 recoilless rifle, but the rocket launchers are magazine-fed. The weapons can be controlled either from a gunner's position or from the forward cabin.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$635,813	D, G, AvG, A	1.5 tons	42 tons	2+8	13	Thermal Imaging, Image Intensification, Radar, Sonar	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor

154/92	35/25/4	900	240	CIH	W(8)	TF3 TS3 TR3 HF12Sp HS6Sp HR5
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Fire Control	Stabilization	Armament	Ammunition
+4	Good	2x7-round Hydra-70 launchers, 2xM-67 recoilless rifles (F), MAG (F), 2xMAG (S), MAG (R)	14xHydra-70 rockets, 16x90mm rockets, 6000x7.62mm

M-2A3 Bradley III

Country of Origin: United States

Notes: This vehicle does not exist in real life. There is in fact going to be (or already is by now) a version of the Bradley known as the M-2A3, but this is *not* it. This version was made up by the *Twilight 2000* designers at GDW, though I have come up with more back story.

Twilight 2000 Notes: In late 1995, as existing M-2 and M-2A1 Bradleys in US service began to be gathered and replaced by M-2A2s, TACOM fitted the older Bradleys with a new turret and appliqué armor. Fire control was also improved. In many cases, components designed for the M-2A2 were actually retrofitted to the M-2A3. Lugs were added for reactive armor to the HS and F faces of the vehicle.

These modified Bradleys were designated M-2A3, and were then reissued to replace battle losses in Europe, the Middle East, and Korea. However, the lion's share of these new variants were issued to units fighting the Mexicans and Russians in the American Southwest, Pacific Northwest, and Alaska, due to problems with transporting them to farther locales. In the M-2A3, the standard turret is replaced with one mounting twin Hellfire ATGMs instead of the standard TOW II launchers, one launcher on each side of the turret. Three subtypes of the M-2A3 were built: The M-2A3E1, with a standard 25mm ChainGun; the M-2A3E2, with a 30mm ChainGun, and the M-2A3E3, armed with a 35mm ChainGun.

M3A3 variants of the M3 Bradley CFV were also built in the same manner, though in smaller numbers (as there were less M3s in the first place).

Merc 2000 Notes: This vehicle does not exist in the Merc 2000 timeline.

Vehicle	Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
M-2A3E1	\$414,018	D, A	1.5 tons	33.42 tons	3+7	14	Thermal Imaging (D), FLIR (C), 2 nd Gen FLIR (G), Image Intensification (G)	Shielded
M-2A3E2	\$436,082	D, A	1.5 tons	33.49 tons	3+7	15	Thermal Imaging (D), FLIR (C), 2 nd Gen FLIR (G), Image Intensification (G)	Shielded
M-2A3E2	\$457,626	D, A	1.5 tons	33.56 tons	3+7	16	Thermal Imaging (D), FLIR (C), 2 nd Gen FLIR (G), Image Intensification (G)	Shielded
M-3A3E1	\$480,926	D, A	1.34 tons	36.09 tons	3+3	14	Thermal Imaging (D), FLIR (C), 2 nd Gen FLIR (G), Image Intensification (G)	Shielded
M-3A3E2	\$509,825	D, A	1.34 tons	35.61 tons	3+3	15	Thermal Imaging (D), FLIR (C), 2 nd Gen FLIR (G), Image Intensification (G)	Shielded
M-3A3E2	\$538,724	D, A	1.34 tons	35.67 tons	3+3	16	Thermal Imaging (D), FLIR (C), 2 nd Gen FLIR (G), Image Intensification (G)	Shielded

Vehicle	Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor*
M-2A3E1	116/87	25/19	662	149	Trtd	T4	TF11Sp TS11Sp TR6Sp HF13 HS8Sp HR6
M-2A3E2	116/87	25/19	662	149	Trtd	T4	TF11Sp TS11Sp TR6Sp HF13 HS8Sp HR6
M-2A3E3	116/87	25/19	662	149	Trtd	T4	TF11Sp TS11Sp TR6Sp HF13 HS8Sp HR6
M-3A3E1	116/81	27/19	662	149	Trtd	T4	TF11Sp TS11Sp TR6Sp HF13

M-3A3E2	116/81	27/19	662	149	Trtd	T4	HS8Sp HR6 TF11Sp TS11Sp TR6Sp HF13
M-3A3E2	116/81	27/19	662	149	Trtd	T4	HS8Sp HR6 TF11Sp TS11Sp TR6Sp HF13 HS8Sp HR6

Vehicle	Fire Control	Stabilization	Armament	Ammunition
M-2A3E1	+4	Good	25mm ChainGun, M-240C, 2xHellfire ATGM Launchers, 2xM-231	900x25mm, 2200x7.62mm, 5xHellfire ATGM, 1025x5.56mm
M-2A3E2	+4	Good	30mm ChainGun, M-240C, 2xHellfire ATGM Launchers, 2xM-231	750x25mm, 2200x7.62mm, 5xHellfire ATGM, 1025x5.56mm
M-2A3E3	+4	Good	35mm ChainGun, M-240C, 2xHellfire ATGM Launchers, 2xM-231	640x25mm, 2200x7.62mm, 5xHellfire ATGM, 1025x5.56mm
M-3A3E1	+4	Good	25mm ChainGun, M-240C, 2xHellfire ATGM Launchers	1200x25mm, 2900x7.62mm, 7xHellfire ATGM
M-3A3E2	+4	Good	30mm ChainGun, M-240C, 2xHellfire ATGM Launchers	900x30mm, 2900x7.62mm, 7xHellfire ATGM
M-3A3E2	+4	Good	35mm ChainGun, M-240C, 2xHellfire ATGM Launchers	750x35mm, 2900x7.62mm, 7xHellfire ATGM

*Floor armor for the M-2A3 Bradley III is 7.

M-113: US Experimental Variants

Country of Origin: United States

Notes: These are experimental APC versions of the M-113 built by the US. Some existed only on the drawing board, some were built only as prototypes or demonstrators, and some almost made it into production, only to be cut at the last moment or be overtaken by new technology.

Stretched M-113A1

Based on the M-113A1, the Stretched M-113A1 was designed primarily as a combat resupply vehicle, with the increased interior room to be used for cargo. However, lengthened versions of the standard passenger seats were installed down the sides, and another secondary consideration was to use the Stretched M-113A1 as a forward command post vehicle or as a prime mover for towed artillery pieces. The Stretched M-113A1 was extended in length over half a meter, adding some 2 cubic meters of cargo space. In addition, the suspension was beefed up, nearly doubling the cargo capacity, and the Stretched M-113A1 had seven roadwheels on each side. The rear deck cargo hatch was also enlarged and turned into a two-piece unit; these hatches hinge upwards in the middle, and include overhead cover supported by poles to form overhead cover/sunshade. The rear hatch was also slightly enlarged. The Stretched M-113A1 did not go into production, but the concept would appear again in the early 1990s as the MTVL (based on the M-113A3), and several prototypes were built for evaluation.

XM-734 MICV

Also known as the MICV-65, the XM-734 was one of the first steps on the road to the M-2/M-3 Bradley. The XM-734, though visibly based on the M-113A1, was also visibly quite different. The first step was to allow the infantrymen to fight from inside armor protection. Four sets of firing ports were installed on the right side, and three on the left (due to the fuel tank positioning); two more were installed in the rear ramp, one of which was in the door. Firing ports could accept standard M-16A1s, M-1911 pistols, or the M-3A1 submachinegun. Armor protection was increased somewhat with sheet steel appliqué. A more powerful 260-horsepower was installed, along with a matching transmission. The conventional commander's station was replaced with a small turret; several armament configurations were tried, but the last and most heavily-armed variant used an M-139 20mm autocannon with an M-219 7.62mm machinegun as a coaxial weapon. A very few XM-734s were combat-tested in Vietnam. The XM-734 could still carry 11 troops, but it was a tight squeeze (it could even carry 12 with an even tighter squeeze, but it was not recommended). The XM-734 was thought to be promising, but not promising enough, and research continued.

XM-765

The XM-765 began development in 1967, and several variants were built (differing mostly in armament and cupolas) into several

forms before finally being canceled in 1970 in favor of a further modified version called the M-113A1PI. The program came to an end in the US in the early 1970s, but by then several European countries had taken an interest in the M-113A1PI design, and it became the AIFV (covered in other sections).

The XM-765 retained the power pack, suspension, and tracks of the M-113A1, but the hull was heavily modified. The passenger compartment took on a radically different form, with the upper hull sides being sloped at an angle of about 30 degrees and fitted with four firing ports on each side, along with two in the rear ramp. The firing ports could accept any M-16 rifle or the M-3A1 submachinegun. The front and side armor was increased in effectiveness by incorporating spaced armor. A 379-liter fuel tank was installed under the floor of the passenger compartment, replacing the fuel tanks in the M-113A1's walls. A new commander's cupola was installed, armed with a 20mm M-139 autocannon that could be aimed and fired (but not reloaded) from under armor.

Some of the biggest strikes against the XM-765 were inadequate power and range for the increased weight. This caused an ill-advised reduction in armor protection, especially the spaced armor. The cupola and the weapon mount were retained, but the weapon was replaced with an M-2HB machinegun. The bench seats running down the center of the passenger compartment were replaced by rotating individual seats, with two being added for the ramp gunners. Two additional ventilation fans were also added for the passenger compartment.

PI M-113A1

The PI (Product-Improved) M-113A1 was a test vehicle built in 1970 aimed at increasing the M-113A1's firepower and survivability. The survivability improvements consisted of bolt-on spaced laminate steel armor, with the spaces between the armor panels being filled with polyurethane foam to allow the M-113A1 to retain its amphibious capability; a high-displacement trim vane also assisted with this. The fuel tanks were moved to the rear of the vehicle, and protected on the outer sides by the new spaced armor; the rest of the tanks were also protected by increased steel armor.

The sides of the hull were heavily-modified based on experience with the XM-765, with three vision blocks on each side of the hull in a sloping armor section. Experience with the XM-765 showed that only two troops could properly fire through firing ports on each side of the vehicle, so the third man on each side had only a vision block, without a firing port. In the rear ramp was another firing port with a vision block. Seats were provided for ten passengers, one of which was the commander. The commander had his own cupola behind that of the gunner's station; this cupola was unarmed, but had a 6x binocular scope along with seven vision blocks. There was no rear deck roof hatch.

The cupola was replaced with one that had a lower silhouette; this cupola could be armed with the M-139 autocannon or an M-2HB, both of which could be fired (but not reloaded) from under armor. The primary armament version tested was the M-139 autocannon. The gunner also had a 6x periscope sight along with seven other standard vision blocks.

The PI M-113A1 used a more powerful 260-horsepower engine, and the suspension beefed up to handle additional weight and improve cross-country performance.

The US Army decided not to develop the PI M-113A1 or the XM-765 further, but the Dutch saw promise in them, and ordered several PI M-113A1s in 1974 for extensive testing. These Dutch test vehicles evolved into the AIFV.

Vehicle	Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
Stretched M-113A1	\$74,004	D, A	3.04 tons	16.17 tons	2+15	5	Passive IR (D)	Shielded
XM-734	\$139,376	D, A	800 kg	13.69 tons	2+9	6	Passive IR (G+D)	Shielded
XM-765 (v1)	\$148,092	D, A	800 kg	13.54 tons	3+9	8	Passive IR (G+D)	Shielded
XM-765 (v2)	\$150,852	D, A	1 ton	12.04 tons	2+10	6	Passive IR (C+D)	Shielded
PI M-113A1	\$252,819	D, A	1 ton	12.23 tons	2+10	7	Passive IR (G+D)	Shielded

Vehicle	Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
Stretched M-113A1	114/80	25/15/3	360	148	Std	T3	HF6 HS4 HR4
XM-734	121/85	26/15/3	416	155	Std	T2	TF4 TS3 TR2 HF7 HS5 HR4
XM-765 (v1)	122/85	26/15	379	155	CiH	T2	TF3 TS2 TR2 HF7Sp HS5Sp HR4
XM-765 (v2)	129/90	28/16/3	379	147	CiH	T2	TF3 TS2 TR2 HF6 HS5 HR4
PI M-113A1	131/91	27/16/3	416	143	CiH	T2	TF3 TS2 TR2 HF8Sp HS6Sp HR5

Vehicle	Fire Control	Stabilization	Armament	Ammunition
Stretched M-113A1	None	None	M-2HB (C)	2000x.50
XM-734	+1	Basic	20mm M-139, M-219	400x20mm, 1840x7.62mm
XM-765 (v1)	+1	Fair	20mm M-139	500x20mm
XM-765 (v2)	+1	Fair	M-2HB	1500x.50
PI M-113A1	None	None	20mm M-139	400x20mm

M-113A1 With LAV-25 Turret

Country of Origin: Canada

Notes: The M-113A1 was upgraded in such a manner at the request of the Canadian Army, but it was decided to not go ahead with upgrading the entire M-113A1 fleet.

Twilight 2000 Notes: As an experiment, some Canadian M-113A1s were fitted with the same turret as the LAV-25. When the

Twilight War broke out, the prototypes were taken into service as the CM-113A1, and series production was begun. These vehicles were primarily retained in the home defense role, and most were sent to the western Canadian provinces of British Columbia and Yukon, as well as the Northwest Territories to counter the Russian invasion. These vehicles, like most Canadian LAV-25s, add a MAG for antiaircraft and anti-troop use by the commander's hatch. Since these are modifications of older M-113s, most do not have a wear value of better than 4. The layout is generally similar to the standard M-113, but the large hatch on the rear deck is eliminated, as with the turret mounted, there is no room for it.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$214,890	D, A	1 ton	15.35 tons	3+6	7	Passive IR	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
152/107	35/25/3	360	112	Trtd	T2	TF6 TS4 TR4 HF6 HS4 HR4

Fire Control	Stabilization	Armament	Ammunition
+1	Basic	25mm ChainGun, MAG	630x25mm, 1620x7.62N

M-113 Model 607

Country of Origin: Germany

Notes: This is a German variant of the M-113A1, with a KUKA 607 turret mounting an M-2HB machinegun, a new engine, and a fully automatic transmission and steering yoke. This is an upgrade proposed by FFG in 1997, but few if any of these conversions have been done for operational vehicles.

Twilight 2000 Notes: About 150 of these vehicles were available for the Twilight War.

Merc 2000 Notes: The conversion program was never carried out.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$29,783	D, A	1 ton	15 tons	2+10	6	Passive IR	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
137/96	30/20/4	360	109	Trtd	T2	TF3 TS3 TR3 HF6 HS4 HR4

Fire Control	Stabilization	Armament	Ammunition
+1	Basic	M-2HB	2000x.50

M-115A1 ACCV

Country of Origin: United States

Notes: This vehicle does not exist in real life; it is an invention of the designers at GDW. I have come up with a little more back story.

Twilight 2000 Notes: This Armored Cavalry Combat Vehicle is originally a Canadian idea. In the late 1980s, they began, first as an experiment, and then operationally, topping some of their M-113A2s with the same turrets used on LAV-25 wheeled armored personnel carriers. The US Army, especially National Guard formations, borrowed this idea during the Twilight War, using them in place of the shorter-supplied M-3 Bradley Cavalry Vehicles. The turret almost completely takes up the deck of the vehicle.

Merc 2000 Notes: This vehicle does not exist.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$214,890	D, A	1 ton	15.35 tons	3+6	7	Passive IR	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
152/107	35/25/3	360	112	Trtd	T2	TF6 TS4 TR4 HF6 HS4 HR4

Fire Control	Stabilization	Armament	Ammunition
+1	Basic	25mm ChainGun, MAG	630x25mm, 1620x7.62N

M-119A1

Country of Origin: Israel

Notes: The M-119A1 was originally an Israeli improved version of the M-113 ACCV, and during the war several M-113s were converted to this designation. The vehicle's turret mounts a 60mm HVMS autocannon to be used in bunker busting and general infantry support operations. The M-119A1 comes standard with an improved RAPI armor system that increases its survivability against heavy machineguns and RPGs. The vehicle became popular with American troops who liked the increased armor and heavier caliber support weapon. The M-119A1 is often fitted with reactive armor (TF, TS, HF), and may use the M-113s appliqué hull armor. Though technically an APC, it stretches that definition.

The M-119A1 models deployed to the Middle Eastern theater have earned the nickname "Combat Taxis" by the troops and crews. Some test models have been sent back to the US for analysis.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$243,929	D, A	1 ton	14 tons	3+6	7	Active/Passive IR	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
100/70	20/15/2	360	109	Trtd	T2	TF10 TS4 TR4 HF6 HS4 HR4

Fire Control	Stabilization	Armament	Ammunition
+2	Fair	60mm HVMS, MAG; MAG, M-2HB, or Mk19 (C)	80x60mm; 4000x7.62mm, or 2000x7.62mm and 2000x.50, or 2000x7.62mm and 500x40mm grenade

Marder 1A3/40mm

Country of Origin: Germany

Notes: Developed as an experiment from the standard Marder 1A3, the Marder 1A3/40mm has not been adopted by the Bundeswehr, and probably never will be due to budgetary reasons.

Twilight 2000 Notes: Just before the commencement of the Twilight War, the Germans (amongst many other countries) realized that the rather light autocannons arming most of their IFVs simply weren't going to cut the mustard. The Germans decided to solve this problem while spending as little as possible -- they up-gunned the standard Marder 1A3 with Bofors 40mm L/70 autocannons traded and bought from the Swedes, and while they were at it, improved the night vision suite. The result was the Marder 1A3/40mm, (sometimes referred to as the Marder 1A4, though this was a non-official appellation). The Germans did not have time to bring the new gun's mounting and stabilization up to Marder 1A3 standards, and had to enlarge the turret to fit the Bofors gun, making the 1A3/40mm easily identifiable. In addition, the extra weight of the new turret and gun do take away from the cargo-carrying capabilities of the vehicle, as well as making the interior a bit more cramped. The Marder 1A3/40mm was adopted in small numbers, but never enough to satisfy the Bundeswehr, for they were quite effective at protecting their troops and dispensing with most enemy APCs.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$424,010	D, A	800 kg	34.8 tons	3+5	17	Thermal Imaging, Image Intensification	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
104/73	30/20	652	176	Trtd	T4	TF12 TS7 TR7 HF27 HS12 HR8

Fire Control	Stabilization	Armament	Ammunition
+2	Fair	40mm Bofors L/70, MG-3, Milan II Launcher	700x40mm, 5000x7.62mm, 5xMilan II

MOWAG Improved Tornado

Country of Origin: Switzerland

Notes: This is an upgrade of the first Tornado. It features an overhead mount for an autocannon, coaxial machinegun, and missile launcher. The driver is in the front left of the hull with an overhead hatch; the commander has a small hatch in the remote turret. The rear of the hull has a ramp. There are two firing ports in each side of the hull and two in the rear; in addition, there are two remote machineguns on the hull deck at the rear. This vehicle was not adopted by any country, but is still being offered by MOWAG. It is interesting for its heavy armament, and is presented here as a "what-if."

Vehicle	Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
35mm	\$133,899	D, A	1.75 tons	22.3 tons	3+7	9	Passive IR, Image Intensification	Shielded
25mm	\$112,208	D, A	1.75 tons	22.3 tons	3+7	9	Passive IR, Image Intensification	Shielded

Vehicle	Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
(Both)	135/94	31/22/3	500	136	CiH	T4	TF6 TS5 TR4 HF8 HS4 HR3

Vehicle	Fire Control	Stabilization	Armament	Ammunition
35mm	+3	Fair	35mm KDA Autocannon, MAG, 2xTOW II Launchers, 2xMAG (Rear)	500x35mm, 3500x7.62mm, 5xTOW II ATGM
25mm	+3	Fair	25mm KBA Autocannon, MAG, Milan Launcher, 2xMAG (Rear)	700x25mm, 3500x7.62mm, 7xMilan ATGM

MOWAG Trojan

Country of Origin: Switzerland

Notes: This is a tracked armored personnel carrier first produced for the requirements of the Swiss Army. The Swiss eventually went with the CV-9030 (see Swedish APCs), but in 1992 the Finnish company Patria Vehicles bought the design and manufacturing rights, calling the vehicle the TC-500, and modified it for use in extreme temperatures (especially cold) and deep snow and ice. The vehicle was designed to be modular for easy upgrading and easy servicing. Add-on extra armor can be added; this weighs 4.5 tons, slows the vehicle by 10%, and costs \$15,000; it adds 4 points of armor to all faces. The vehicles were designed to use three different autocannons, and any of these may be installed in the vehicle with minimal modification in 1 hour. The driver's hatch is on the front left, and, unlike most armored vehicles, the driver has periscopes that allow him to see over the engine on the front right when buttoned up. There are two hatches on the turret deck for the commander and gunner, and a large drop ramp on the rear face for the passengers. The troops have no firing ports, but there is a machinegun cupola with a periscope for suppressive fire.

Vehicle	Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
Trojan (25mm Autocannon)	\$325,015	D, A	1.5 tons	24.65 tons	3+7	14	Thermal Imaging, Image Intensification	Shielded
Trojan (30mm Autocannon)	\$357,159	D, A	1.5 tons	27 tons	3+7	14	Thermal Imaging, Image Intensification	Shielded
Trojan (40mm Autocannon)	\$412,412	D, A	1.5 tons	29 tons	3+7	15	Thermal Imaging, Image Intensification	Shielded

Vehicle	Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
Trojan (25mm Autocannon)	165/115	35/25/4	450	200	Trtd	T3	TF8 TS7 TR4 HF10 HS6 HR6
Trojan (30mm Autocannon)	154/108	35/25/3	450	200	Trtd	T3	TF8 TS7 TR4 HF10 HS6 HR6
Trojan (40mm Autocannon)	147/103	30/20/3	450	200	Trtd	T3	TF8 TS7 TR4 HF10 HS6 HR6

Vehicle	Fire Control	Stabilization	Armament	Ammunition
Trojan (25mm Autocannon)	+3	Fair	25mm KBA, MAG, MAG (Rear)	600x25mm, 1500x7.62N
Trojan (30mm Autocannon)	+3	Fair	30mm Mauser Mk 30, MAG, MAG (Rear)	500x30mm, 1500x7.62mm
Trojan (40mm Autocannon)	+3	Fair	40mm Bofors L/70, MAG, MAG (Rear)	400x40mm, 1500x7.62mm

Panhard VCR-2

Country of Origin: France

Notes: This medium wheeled APC has only been developed to the prototype stage as of yet. It is a stretched VCR TT 2, with 8 roadwheels and about 25% larger than that vehicle. It is being developed for the requirements of the Polish Army for a new wheeled armored personnel carrier with good cross-country performance, high road speed, and decent firepower. Four turret choices are available, with the 25mm-armed version being the most likely to be adopted. The VCR-2 may also be fitted with a pintle-mounted machinegun. The layout is similar to the standard VCR TT 2, with a door in the center of the hull on each side, a hatch on the front center deck for the driver, and a large door in the rear of the vehicle for the troops. The turret is normally a small turret with no hatch; however, the version with a pintle-mounted machinegun has a hatch in the center top deck, and the 90mm version has a hatch on the turret roof for the commander and gunner. There are three firing ports on each side of the troop compartment.

Twilight/Merc 2000 Notes: This vehicle does not exist.

Vehicle	Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
Pintle MG	\$38,420	D, A	2 tons	14.8 tons	2+10	5	Passive IR	Shielded
MG Turret	\$126,410	D, A	2 tons	15 tons	3+9	5	Image Intensification, Thermal Imaging	Shielded
20mm Turret	\$131,130	D, A	2 tons	15 tons	3+9	5	Image Intensification, Thermal Imaging	Shielded
25mm Turret	\$134,283	D, A	2 tons	15 tons	3+9	5	Image Intensification, Thermal Imaging	Shielded
90mm Turret	\$220,189	D, A	1.5 tons	15.8 tons	3+5	5	Image Intensification, Thermal Imaging	Shielded

Vehicle	Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
Pintle MG	162/66	41/17/4	350	97	Stnd	W(6)	HF12 HS6 HR4
MG/20/25mm Turret	160/64	40/16/4	350	97	CiH	W(6)	TF5 TS4 TR3 HF12 HS6 HR4

90mm Turret	156/62	39/16/4	350	97	Trtd	W(6)	TF5 TS4 TR3 HF12 HS6 HR4
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Vehicle	Fire Control	Stabilization	Armament	Ammunition
Pintle MG	None	None	M-2HB	2000x.50
MG Turret	+3	Fair	M-2HB, AAT-F1	1500x.50, 2200x7.62mm
20mm Turret	+3	Fair	20mm M621 Autocannon, AAT-F1	1000x20mm, 2200x7.62mm
25mm Turret	+3	Fair	25mm M811 Autocannon, AAT-F1	800x25mm, 2200x7.62mm
90mm Turret	+3	Fair	90mm French Gun, AAT-F1	22x90mm, 2200x7.62mm

Pbv-402

Country of Origin: Sweden Notes: As a test, the complete turret of a CV-9040 was mounted on an MT-LB. This was done to quickly and cheaply mechanize infantry units that were foot-mobile or mounted only in trucks or light vehicles. Though the experiment was deemed substantially a success, it was deemed even cheaper to simply place those troops in overhauled MT-LBs for the time being. The Pbv-402 project was therefore put on indefinite hold, and few if any were actually fielded. (I'm not sure if "Pbv-402" is an official designation for this design; I believe that this designation was made up by Antti Hentuu, a person well known to the online *Twilight 2000* community as Antenna.)

Twilight 2000 Notes: This vehicle was in limited production before the Twilight War, but was not adopted as a standard until 1999. It is produced by placing the turret of a CV-90 on the hull of an MT-LB APC; often, these turrets were taken from battle-damaged CV-90s with still-functioning turrets. Still more were purposely modified into this standard. The vehicles were used to replace battle losses, but the real CV-90 or even the Pbv-502 was preferred over this vehicle.

Merc 2000 Notes: This vehicle does not exist in the Merc 2000 timeline.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$424,037	D, A	1.2 tons	13 tons	3+6	6	Passive IR, Thermal Imaging, Image Intensification	Enclosed

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
70/49	15/10/2	450	103	Trtd	T4	TF14 TS8 TR6 HF4 HS2 HR2

Fire Control	Stabilization	Armament	Ammunition
+3	Good	40mm Bofors L/70 Autocannon, Ksp m/39, 2x71mm Lyran launchers	240x40mm, 3800x7.62mm, 8x71mm ILLUM Shells

Pbv-502

Country of Origin: Sweden

Notes: The story behind this unusual modification is similar to that of the Pbv-402.

Twilight 2000 Notes: In 1997, Sweden bought 350 ex-East German BMP-1 IFVs from Germany. These vehicles were modified and upgraded; the most dramatic of these upgrades was the replacement of the 73mm cannon turret with a turret from the CV-90 IFV. These vehicles were used to mechanize most of the remainder of Sweden's infantry forces. The upgraded vehicles, called Pbv-502s, are similar in appearance to the Polish BMP-40, and also have new engines and transmissions installed to replace the aging power train in the BMP-1s. Though the CV-90 was the preferred vehicle, the Pbv-502 was better than no vehicle at all.

Merc 2000 Notes: This vehicle does not exist.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$416,282	D, A	1 ton	18.4 tons	3+8	8	Thermal Imaging, Passive IR, Image Intensification	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
72/50	15/10/2	460	128	Trtd	T2	TF14 TS8 TR6 HF8 HS4 HR4

Fire Control	Stabilization	Armament	Ammunition
+3	Good	40mm L/70 autocannon, Ksp m/39, 2x71mm Lyran launchers	238x40mm, 3000x7.62N, 8x71mm ILLUM Shells

TAB-90

Country of Origin: Romania

Notes: This vehicle does not exist; it is the invention of the original designers of the *Twilight 2000* game at GDW. I have elaborated on the back story considerably, however.

Twilight 2000 Notes: This is the result of Romanian experiments in designing a light APC for scout teams. The TAB-90 is a small vehicle; barely large enough for its crew, and normally less than a full complement of passengers were carried in order to carry more supplies, especially on extended reconnaissance missions. The TAB-90 has an unusually quiet engine, and enemy troops often found

the TAB-90 much closer to their positions than they expected it to be, without warning. The exhaust is also filtered so the normal heavy plume of smoke given off by diesel engines is more subdued in the TAB-90. The main fault of the TAB-90, other than its light construction, is its high profile, nearly three meters high; this not only made it easy to spot against the horizon, but also made it vulnerable to tipping on uneven ground. It was, however, a good observation platform. The TAB-90 has a hatch on the front left deck for the driver, two hatches on the turret deck for the gunner and commander, and a door in the rear of the hull for the passengers. In addition, there is a firing port on each side of the hull, and one in the rear door.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$199,162	D, A	1 ton	10 tons	3+6	6	Passive IR, Image Intensification	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
189/132	40/30/5	500	107	Trtd	T2	TF5 TS3 TR2 HF4 HS3 HR3

Fire Control	Stabilization	Armament	Ammunition
+2	Fair	23mm Autocannon, PKT	200x23mm, 1500x7.62mm

TH-495

Country of Origin: Germany

Notes: This vehicle exists in prototype form only.

Twilight 2000 Notes: This infantry fighting vehicle was designed in the mid-1990s in Germany to replace the Marder. Production began in 1996, but all three production lines were destroyed by late 1997 and as a result the TH-495 did not make much headway in replacing the Marder, equipping only a few front-line battalions. Those that made it to service gave a good accounting of themselves in combat, their heavy caliber autocannons able to destroy and out-range opposing vehicles, and their missiles (usually TOW IIIs) able to take out even main battle tanks. The vehicle is state of the art, able to fire at full speed and with targeting systems normally found on advanced tanks. A few were produced in a shorter version with only 5 roadwheels; however, they were produced only as prototypes, and were sent to combat units only as an emergency measure. Most have 6 roadwheels, and this is the version presented below. A few of these vehicles, perhaps 25 in all, were produced for Malaysia and sent there before ship traffic became scarce.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$428,967	D, G, AvG, A	1.2 tons	25.9 tons	3+7	10	Thermal Imaging, Image Intensification	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
146/102	30/20/3	700	126	Trtd	T4	TF21Sp TS11Sp HR9 HF26Sp HS8Sp HR6

Fire Control	Stabilization	Armament	Ammunition
+4	Good	30mm Bushmaster II, MG-3, 2xTOW II/III launchers	820x30mm, 4500x7.62mm, 6xTOW II/III ATGM

Vextra 25

Country of Origin: France

Notes: The APC version of the Vextra is topped with an upgraded Dragar turret armed with a 25mm autocannon. The driver is on the front left, the one-man turret has a hatch on the roof, and there are four hatches on the rear deck. There is a power ramp in the rear hull for passenger access. A sore point among troops using this vehicle is the lack of firing ports, forcing infantrymen to expose themselves to fire through the deck hatches to return fire. Though the Vextra 25 is in an advanced testing phase as of 2006, it is already being marketed, but has no buyers as of yet.

Twilight 2000 Notes: This new French APC began production for the French and German armies just prior to the Twilight War. Designed to replace the AMX-10P and VAB in the French Army and the Fuchs and M-113 series in the German Army, fewer than 100 of these vehicles made it to each army before production stopped for the German Army and focused on the French Army. Many of these vehicles were sent to the Middle East, where their ability to keep up with Leclerc and AMX-40 tanks made them valuable.

Merc 2000 Notes: This vehicle got lost in the budget shuffle and was never put into production.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$220,022	D, A	1.64 tons	25.7 tons	2+9	7	Passive IR, Image Intensification	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
160/91	35/20	580	154	Trtd	W(6)	TF5 TS5 TR4 HF10Sp HS6Sp HR5

Fire Control	Stabilization	Armament	Ammunition
+3	Good	25mm KBA autocannon, AAT-F1	1200x25mm, 2800x7.62mm

Ze'ev IFV

Country of Origin: Israel

Notes: This vehicle does not exist in real life; it was made up by Frank Frey of GDW. (I asked Frank about the Ze'ev IFV once, and he told me that in his mind, the turret sort of looks like a Bradley turret without the TOW launcher box, atop a hull that looks sort of like that of the Marder.)

Twilight 2000 Notes: An Israeli built tracked, IFV variant of the Ze'ev Mobile Armored Gun System. The IFV has a remote turret mounted on the center top deck. The commander, driver, and gunner ride in the chassis along with 6 infantrymen. There are two firing ports on each side of the vehicle. There are separate hatches for the commander, driver and gunner on the top deck. There is a powered ramp door with two additional firing ports in the rear hull of the vehicle.

Merc 2000 Notes: This vehicle does not exist.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$300,501	D, A	500 kg	22.56 tons	3+6	8	Passive IR, Thermal Imaging	Shielded
Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor	
129/91	30/20	650	153	CiH	T4	TF12 TS10 TR5	HF16Sp HS12Sp HR6
Fire Control	Stabilization	Armament		Ammunition			
+3	Good	35mm Bushmaster III autocannon, Mk19		300x35mm, 100x40mm grenades			

LAV-LOSAT

Nation of Origin: Canada

Notes: This is a LAV-25 with the normal turret replaced with a 12-tube Hypervelocity Missile launcher turret. This vehicle has not been produced in real life, though prototypes have been built.

Fictional Notes: In the Twilight 2000 timeline this was produced for the US Marines, but a very few were produced, and all of them were deployed to the Middle East.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$387,457	D, A	300 kg	12 tons	3	10	Passive IR, Thermal Imaging	Enclosed

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
191/115	40/24/4	300	93	Trtd	W(6)	TF6 TS4 TR4 HF6 HS4 HR4

Fire Control	Stabilization	Armament	Ammunition
+3	Fair	12-round HVM launcher, C-6 (C)	24xHVM, 600x7.62mm

LAV MPLS (Multiple Purpose Launch System)

Nation of Origin: Canada

Vehicle Type: Multipurpose Weapons Platform

Notes: This is a LAV chassis, with the area behind the driver's and commander's positions chopped down and the armor removed to form a flatbed. On this flatbed is a very large turret mounting a quadruple Chaparral mount, a 7-round Hydra-70 rocket pod, and two Hellfire ATGM launchers. Typically, the Chaparrals are for antiaircraft work, the Hydra-70s are for antihelicopter use, and the Hellfires are for antivehicle attacks. The Hydra-70s are also used as artillery rockets in some cases. There is a machinegun mount by the commander's hatch for local defense. Like the LAV-LOSAT, the LAV MPLS was produced only as prototypes, though they were developed to the advanced prototype stage.

Fictional Notes: In the Twilight 2000 timeline, this hybrid system was used only by Saudi Arabia before the Twilight War (in very small numbers), but was manufactured for US and Canadian forces during the war. These vehicles, despite their small numbers, were used to great effect by Saudi and US Marine forces in the Middle East, where they were called "Damnation Machines" by the Russian, Iranian, and Iraqi forces that faced them.

In the Merc 2000 timeline, the MPLS very nearly faced a quiet death until the US Military latched onto them for their new Stryker Brigades. (The US Army also experimented with the turret on a Stryker/LAV III chassis, but the resulting vehicle was judged to be too heavy, unwieldy, and expensive.)

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$555,734	D, A	500 kg	14 tons	3	14	Passive IR	Enclosed

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
171/102	37/22/4	300	107	Trtd	W(6)	TF4 TS3 TR3 HF6 HS4 HR4

Fire Control	Stabilization	Armament	Ammunition
+3	Basic	4xChaparral SAM launchers, 7-round Hydra-70 launcher, 2xHellfire ATGM launchers, C-6 (C)	4xChaparral SAMs, 21xHydra-70 rockets, 8xHellfire ATGM, 1000x7.62mm

M-41E Cazador

Nation of Manufacture: Spain

Notes: This Spanish vehicle is a refurbished M-41 light tank, with the usual gun turret replaced by a twin TOW launcher of the same type as mounted on the M-901A1 ITV vehicle. To the rear of this mount on the rear deck is a hatch for reloading the launcher. There are two hatches on the front deck for the driver and commander, and there is a weapon mount in front of a center deck hatch in front of the launcher. On the glacis plate are eight smoke grenade launcher barrels. This was tried as an experiment in order to get some use out of aging M-41 tanks, but never put into production.

Twilight 2000 Story: This vehicle was only in Spanish service at the time of the Twilight War.

Fictional Notes: In the Twilight 2000 timeline, this vehicle was only in Spanish service, and only in small numbers. They nonetheless acquitted themselves very well.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$95,887	D, A	600 kg	23 tons	4	11	Passive IR	Enclosed

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
134/93	30/20	850	133	CiH	T4	TF2 TS2 TR2 HF12 HS8 HR6

Fire Control	Stabilization	Armament	Ammunition
+2	None	Twin TOW II launcher, MAG (C)	12xTOW II ATGM, 2000x7.62mm

M-920 Hellfire AT Vehicle

Nation of Manufacture: United States

Notes: This is the M-2A1 Bradley chassis with the turret removed and a quadruple Hellfire antiarmor missile launcher fitted into its place. As far as I know, this vehicle is the product of the imaginations of the designers at GDW, and was never actually even considered by the US military in any form.

Fictional Notes: This vehicle exists only in the Twilight 2000 timeline; it is the M-2 Bradley chassis with the turret removed and a quadruple Hellfire antiarmor missile launcher fitted into its place. It was decided later in the war with helicopters and the fuel to fly them becoming more scarce that vehicles able to launch Hellfire missiles needed to be developed, and as quickly as possible. The M-920 was sometimes manufactured as such, but more often, they were built on intact Bradley hulls which had damaged turrets, and a turret kit for the Hellfire missile system which could be installed in the field at rear-echelon vehicle maintenance units.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$224,356	D, A	200 kg	29.6 tons	4	13	Thermal Imaging, Image Intensifier	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
153/107	35/25/3	662	217	CiH	T4	TF2 TS2 TR2 HF8 HS4Sp HR4

Fire Control	Stabilization	Armament	Ammunition
+2	Fair	Quadruple Hellfire launcher, MAG (C)	12xHellfire ATGM, 600x7.62mm

M-921 Bradley-LOSAT

Nation of Manufacture: United States

Notes: LOSAT stands for Line-Of-Sight Anti-Tank. The M-921 is an M-2A2 Bradley chassis with a 12-round Hypervelocity Missile turret replacing the standard turret. This weapon system is basically in a holding pattern; no further funds have been allocated to its development, but it has not been officially killed, either.

Fictional Notes: In the Twilight 2000 timeline, very few of these vehicles were produced (perhaps a dozen), and all were deployed to Europe. In the Merc 2000 timeline, budget difficulties killed this program before a single prototype could be built.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$398,268	D, A	300 kg	29.5 tons	3	13	Passive IR, Thermal Imaging	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
153/107	35/25/3	662	217	Trtd	T4	TF4 TS4 TR4 HF13 HS8Sp HR16

Fire Control	Stabilization	Armament	Ammunition
+3	Fair	12-round LOSAT launcher, MAG (C)	24xLOSAT ADATS, 600x7.62mm

M-922 Buford-LOSAT

Nation of Manufacture: United States

Notes: This is an M-8 Buford airborne combat vehicle with the standard turret replaced by a 12-tube Hypervelocity Missile turret. It does not have the special ammunition storage system that the standard Buford has, nor can the new turret be fitted with add-on turret armor packages (though the hull may still be equipped with these packages). This system was killed along with the standard M-8 Buford, though the on-and-off rumors of the Buford's resurrection could mean that this program will also be resumed.

Fictional Notes: In the Twilight 2000 timeline, very few of these vehicles were produced (perhaps a dozen for each division), and all were deployed to the Middle East with the 82nd and 101st Airborne Divisions. In the Merc 2000 timeline, production of these vehicle was undertaken at a very slow rate along with the M-8 Buford; perhaps one M-922 was produced for every ten M-8s.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$385,260	D, A	300 kg	18.5 tons/20.82 tons/23.59 tons	3	9	Passive IR, Thermal Imaging	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
186/130	40/30	568	195	Trtd	T4	TF6 TS6Sp TR4Sp HF4/6Sp/20Sp HS3/6Sp/14Sp HR4Sp/4Sp/4Sp

Fire Control	Stabilization	Armament	Ammunition
+3	Fair	12-round LOSAT launcher, MAG (C)	24xLOSAT ADATS, 1000x7.62mm

Panther

Nation of Manufacture: Germany

Notes: This is a tank destroyer based on the hull of the Leopard 1 chassis. They were converted by removing the turret and fitting an elevating arm with a 3-round pod firing Trigat ATGM. The arm can be raised to a height of 5 meters and contains all the sensors needed to target and guide the missiles. The sight is downlinked to a gunner's position in the hull, which guides the missiles via a TV monitor. There is a hatch on the center front deck for the driver, one on the right deck behind the driver for the commander, and a large hatch behind the elevating arm for reloading of missiles. This program was cancelled in the early 1990s after only one prototype was built.

Fictional Notes: In the Twilight 2000 timeline, a few of these conversions were done before the war, but the program was actually cancelled for a short time; more were done after the war commenced. In the Merc 2000 timeline, Germany, Switzerland, Austria, and Italy use this vehicle.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$372,284	D, G, A	700 kg	38.7 tons	3	15	Thermal Imaging, Image Intensification	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
111/78	25/15	985	215	CiH	T6	TF4 TS4 TR4 HF26 HS12 HR8

Fire Control	Stabilization	Armament	Ammunition
+4	None	3xTrigat Launchers, MG-3 (C)	20xTrigat ATGM, 4000x7.62mm

Ratel ZT-3

Nation of Manufacture: South Africa

Notes: This is a Ratel-20 APC with the turret replaced with one mounting a triple Swift ATGM launcher, a coaxial MAG machinegun, and two smoke grenade launchers on either side of the turret. The Ratel in this configuration retains its rear MAG machinegun. The gunner is seated on the right side of the turret and the commander on the left. Unfortunately, the Ratel ZT-3 was cancelled by the mid-1990s, with only a few examples being built.

Fictional Notes: In the Twilight 2000 timeline, the Ratel ZT-3 was not cancelled, and went into full production. In the Merc 2000 timeline, South Africa found itself faced by hostile African neighbors with ever-more sophisticated and capable tanks, and South Africa decided to put the Ratel ZT-3 into full production.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$113,113	D, A	700 kg	19.2 tons	3	14	Passive IR	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
139/84	25/15	430	103	Trtd	W(6)	TF6 TS3 TR3 HF11 HS6 HR4

Fire Control	Stabilization	Armament	Ammunition
None	None	3xSwift launcher, MG-4, MG-4 (Rear)	12xSwift ATGM, 800x7.62mm

VPX- 5000

Nation of Manufacture: France

Notes: This is another of those neat little vehicles that never quite made it into production. The VPX- 5000 is a small scout APC, similar in concept to the US M114, but with a more versatile chassis able to mount several weapons mixes. The MCT (MILAN Compact Turret) is a small mount for two MILAN ATGM launchers. The version with a HOT Launcher has a simple external HOT ATGM. THE MASCOT/MILAN has an externally-mounted remote machinegun and an external MILAN launcher. The BTM208 turret has two machineguns. It is very light and has reasonable performance, but nothing outstanding (other than speed), and that probably led to its demise.

Vehicle	Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
MCT Turret	\$55,635	D, A	300 kg	5.5 tons	3	2	Passive IR	Enclosed
HOT Launcher	\$36,521	D, A	300 kg	5.48 tons	3	2	Passive IR	Enclosed
MASCOT/MILAN	\$38,886	D, A	300 kg	5.51 tons	4	2	Passive IR	Enclosed
BTM208 Turret	\$18,392	D, A	300 kg	5.5 tons	3	2	Passive IR	Enclosed

Vehicle	Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
MCT Turret	224/157	52/37	220	53	CiH	T2	TF1 TS1 TR1 HF4 HS2 HR2
HOT Launcher	225/158	52/37	220	53	Std	T2	HF4 HS2 HR2
MASCOT/MILAN	224/157	52/37	220	53	Std	T2	HF4 HS2 HR2
BTM208 Turret	224/157	52/37	220	53	CiH	T2	TF2 TS2 TR2 HF4 HS2 HR2

Vehicle	Fire Control	Stabilization	Armament	Ammunition
MCT Turret	+1	None	2xMILAN Launchers	8xMILAN ATGM
HOT Launcher	None	None	HOT Launcher	6xHOT ATGM
MASCOT/MILAN	None	None	MILAN Launcher, AAT-F1	6xMILAN ATGM, 500x7.62mm
BTM208 Turret	+1	Basic	M2HB, AAT-F1	300x.50, 500x7.62mm

Alvis/SEI M-11072 LAB

Country of Origin: Britain

Notes: The LAB (Light Assault Bridge) was designed at the request of the US Army, who was at the tail-end of its experimentation of 9ID as light motorized division. The Mowag Piranha II 10x10 chassis was just one of the possible configurations of the LAB; others included basing it on the Alvis Stormer or Shielder chassis, another was to base it on a trailer carrying the spans and a mechanical method to deploy them, along with some trestles. In the end, the LAB went the way of the Dodo along with the experiment that produced the 9LMID.

Fictional History: The 9LMID realized that one of the pieces of kit they would need is a short-span AVLB (they would have preferred a longer-span version, but this would have been size-prohibitive, as the vehicle would have to fit inside a C-130). The bridge used scissors-type deployment, and could be deployed or recovered only from the rear of the vehicle. It used a pair of 7.62-meter ramps and a pair of 15.24-meter spans; the ramps deployed the same time that the spans did. This allowed for a 45-meter crossing, and adjustable trestles could be used to facilitate (the LAB carried four of these, which had to be deployed by manpower. The roadway is 4 meters wide, and is MLC 35. It is made from high-strength aluminum alloy, as is the Piranha base vehicle. The crew does not have to leave the vehicle to deploy it or recover it; only trestle-setting requires exterior troops.

The base Piranha II 10x10 vehicle uses a DURO 350-horsepower 350 turbocharged engine, along with an automatic transmission. The vehicle is armed with a CROWS II-type OWS, armed with an M-240 and a Mk 19 AGL, forward of the bridging equipment and spans. Ammunition, however, is in short supply, as some of the bridging equipment intrudes into the interior space, leading to a low ceiling and little internal storage space. The CROWS can be removed for packing into a C-130. The vehicle is otherwise protected by NBC Overpressure, and has air conditioning and heating. The commander is in the cab and is part of the bridging crew, while the vehicle has a dedicated gunner. There are a pair of rear doors; they are small, however, about half-height.

It should be noted that the LAB was about the largest vehicle the 9LMID regularly used.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$568,934	D, A	400 kg	23.67 tons	3	20	Passive IR (D), Thermal Imaging (G), Image Intensification (G)	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
134/68	38/19	492	124	CiH	W(5)	TF4 TS4 TR4 HF6 HS4 HR4

Fire Control	Stabilization	Armament	Ammunition
+1	Fair	M-240B, Mk 19	750x7.62mm, 140x40mm

Malyshev BREM-64

Country of Origin: Ukraine

Notes: As Russia began to retire its T-64 tanks, some of these vehicles were converted into recovery vehicles for other main battle tanks. These vehicles are known as the BREM-64. The BREM-64 is based on a T-64A chassis. It appears at this time that only one prototype was built; some reports say that it was scrapped, but others say that it has continued development and that the Ukrainians are interested in building a fleet of BREM-64s, as-yet prototype MT-64 AVLBs and a possible CEV from the T-64As they inherited from the Russians. The prototype BREM-64 and MT-64 have appeared at international arms shows, but not in several years. The BREM-64 appears deficient in many ways, compared to its Western counterparts; it may not be in its final form yet.

In this vehicle, the turret is removed and replaced with an armored superstructure. The BREM-64 is equipped with a crane that may lift 2.5 tons (the approximate weight of a Russian tank's power pack); however, it cannot in its current form lift a tank's turret, and that the typical Western tank-based ARV can lift 25 tons or more. The crane can rotate through 250 degrees. The crane is mounted on the center left and is locked down to the rear when travelling. The BREM-64 has a cargo platform on the rear right that may carry the powerpack or other large cargoes. The BREM-64's main winch has a pulling strength of 25 tons, while the secondary winch has a strength of 2.5 tons; note that the typical Western tank-based ARV's main winch can pull about 60 tons. Winching power can be doubled or quadrupled using snatch blocks. The vehicle has a full-width 4-meter dozer blade mounted at the front, which may brace it during lifting and winching operations, or prepare combat positions and clear obstacles. In addition to the standard diesel engine of the T-64, the BREM-64 has a powerful auxiliary power unit of 60 kW, to power vehicle tools without wasting engine fuel. The BREM-64 is equipped with basic tools, tracked vehicle tools, small arms and heavy ordinance tools, a tow bar, a welding unit, an air compressor, two hydraulic jacks, and excavating tools.

The driver of the BREM-64 is in the standard position on the front left of the vehicle. The commander has a cupola on the front right, this is on the superstructure roof instead of being down with the driver. The commander has an electrically-rotating elevated cupola with all around vision blocks, and a night vision channel for its front vision block. His machinegun may aimed and fired from within the vehicle, with the hatch closed. The third crewmember primarily operates the crane and also has an elevated cupola with all-around vision blocks, though he does not have a weapon. The also has a rotating CCTV on a mast to use. The crew has an air conditioner, heater, and an NBC Overpressure system, as well as a ration/water heater. On the front center, in two clusters of four facing outwards in different directions, are smoke grenade launchers. The Ukrainians have tested a version of their BMS on it, as well as equipping it with GPS and a small computer with repair and recovery solutions,

The BREM-64 uses the 5TDF turbocharged multifuel engine of the T-64A. This engine develops 700 horsepower. It has an automatic construction. In addition to the fuel types shown, it may also run on kerosene, jet fuel, and propane. However, this engine makes the BREM-64's engine is notoriously unreliable, and tends to overheat with heavy loads and when towing heavy vehicles or moving at high speed. It may be replaced in the future.

The outdated BREM-1 appears to be a better ARV than the BREM-64 in its current form, and has the virtue of many years of useful service.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$1,339,404	D, G, AvG, A	3 tons	35 tons	3	15	Passive IR (D, C)	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor*
143/100	40/28	1000	260	Std	T6	HF86Sp HS18Sp HR10

Fire Control	Stabilization	Armament	Ammunition
None	None	NSVT (C)	800x12.7mm

CESV

Country of Origin: United States

Notes: This vehicle is similar to the Canadian M-113 ESEV, but based on the larger MTVL chassis. The CESV's ramp may be used as a working platform, and may hold 1.1 tons. It has the same hydraulic auger that may dig in earth, asphalt, and frozen ground to a depth of 3.048 meters and 203mm wide; hydraulic power tools (a chainsaw, jack hammer, impact wrench), a welding set, and an engineer demo chest. The CESV is also equipped with a light turret. As of 2003, only a single demonstrator vehicle has been built.

Twilight 2000 Notes: This vehicle was taken into service by the US Army in late 1996 as the M-113A4 Sapper Vehicle.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$147,965	D, A	4.2 tons	18.14 tons	2+8	10	Passive IR	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
146/102	30/20/3	492	143	CiH	T3	TF3 TS3 TR3 HF6 HS4 HR4

Fire Control	Stabilization	Armament	Ammunition
+1	Fair	M-2HB, MAG	1000x.50, 1500x7.62mm

Forward Repair System-Heavy

Country of Origin: United States

Notes: The FRS-H is based on the chassis of the M-1074 PLS vehicle (a heavy, 10x10 truck). The chassis is lightly armored, and has been modified to accept a work module, tools storage, a crane, and a load area. The crane has a capacity of 7.5 tons -- large enough to lift any major component in the US Army except M-1 series turrets. The vehicle has a minimum of two NATO slave receptacles and can thus jump a minimum of two NATO-compatible vehicles simultaneously. The FRS-H also has a 10kW generator designed to run more quietly than a standard 10kW generator; this can be used to run power tools, the crane, and jump vehicles all at once. The FRS-H typically carries welding and cutting gear, two heavy jacks, and electronic diagnostic gear and computers. The work module has a large roof hatch so that large components can be lowered inside; the cab has a door on each side, and a hatch on the roof with a heavy machinegun mount. This vehicle is not expected to be in service before 2008, if ever.

Twilight 2000 Notes: This vehicle began production shortly before the November Nuclear strikes. Most of them were retained in the Continental US.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$198,246	D, A	13.84 tons	26.08 tons	4	9	Headlights	Enclosed

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
177/106	38/23	379	184	Std	W(5)	HF4 HS4 HR4

Fire Control	Stabilization	Armament	Ammunition
None	None	M-2HB (C)	1000x.50

Future Armor Rearm System (FARS)

Notes: This is one of those ideas that come along every so often that seems so good that it makes me wonder why they never did anything with it. Based on an MLRS chassis, The FARS was designed for rapid reloading of armored and some other types of vehicles in the field, and to be able to reload them faster than they can be reloaded by hand (or in the case of M109s, by conveyor

belt). The FARS was projected to have several versions: one to reload M1 Abrams tanks, one to reload Bradleys, one to reload M109s, and one to reload Apaches. (Obviously, some human intervention would be required, but not nearly as much as is done currently. And before you say it, the FARS was part of the GCV program and the Stryker did not exist yet; doubtless, if the FARS had been adopted, a version for at least the Stryker MGS would have been devised. The M1-reloading FARS was the most developed, with the ammunition going from a turret based on the MLRS launcher through a tunnel to the M1's case ejection port. (It was realized that the case ejection report would have to be modified to allow two-way operation.) To reload Bradleys, the chute would essentially operate as a high-speed conveyor for TOW rounds, and could link directly to the ammunition bins for the autocannon and machinegun (again, it was realized that some modifications of the Bradley would be necessary). For the M109, the FARS would have a moveable chute allowing their ready rounds to be directly reloaded, though extra rounds in bins would have required human assistance. For the Apache, the reloader chute could be linked directly to the autocannon ammunition reloader, though rockets and missiles would again have to be manually reloaded. (The rocket launchers, however, would come out of the FARS with pods already loaded and ready for mounting.) The FARS would have GPS with a mapping module and an early form of BFT. The commander's machinegun would be on an OHWS that many be fired, aimed, and reloaded from under armor.

The big advantage was obviously in reloading the M1, though reloading times would be cut even for other vehicles, particularly the M109. And the FARS would have been decently armored, particularly in the ammunition-carrying turret. One of the times when combat vehicles are most vulnerable is when they are reloading, and the time of this vulnerability would be cut, substantially for the M1 Abrams.

In the end, the probable cause of the FARS' demise was the amount of modifications what would have been required in many vehicles. The GCV programs was eventually cut, and with it, the FARS.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$198,246	D, A, JP8	13.84 tons	28 tons	4	9	Headlights	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
120/91	36/23	617	185	Trtd	T4	TF6 TS6 TR6 HF9 HS5 HR5*

Fire Control	Stabilization	Armament	Ammunition
+1	Basic	M-2HB (C)	1500x.50, 34x120mm or 35x155mm or 1 200x12mm and 7 TOW II rounds or 2000x30mm and 4xLAU-19 rocket launchers and 16xHellfire Missiles

*Hull Roof AV is 5, as is hull floor.

M-1 Wilson AEV (Assault Engineer Vehicle)

Country or Origin: United States

Notes: This vehicle does not exist in real life; it is a concept put forward in an article in *Armor* magazine as a vehicle type that (according to the author) is badly needed in the US Army. As far as I know, the author's idea was ignored.

Twilight 2000 Notes: The M-1 AEV was built to fulfill the need for a modernized assault engineer vehicle. The M-113 series could not keep up with the faster Bradley and Abrams. The Bradley did not have the room for a full engineer squad and all their equipment. The Bradley also lacked the armor protection necessary to breach obstacles. The solution was to take the M-1 Abrams chassis and modify it to fulfill the need.

The vehicle consists of an M-1 Abrams chassis with a small one-man turret mounting a 25mm ChainGun (as on the M-2 Bradley). The turret also has a hardpoint that is usually fitted with a TOW launcher, though it is sometimes fitted with a Hydra-70 pod (similar to those on attack helicopters). The TOW launcher is reloaded from a hatch directly behind the turret (similar to the Bradley). There are two hatches on the roof of the passenger compartment, and a clamshell door on the left side of the hull to allow the passengers to dismount without exposing themselves to enemy fire. There are large lockers on the exterior of the vehicle on each rear side for bulky equipment.

This vehicle was produced in small numbers directly before the outbreak of the Twilight War, and numbers of this vehicle were never high.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$476,483	D, G, AvG, A	1 ton	55 tons	3+6	19	Passive IR, Thermal Imaging	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
186/131	40/30	1907	629	CiH	T6	TF10 TS6 TR4 HF201Cp HS26Sp HR19

Fire Control	Stabilization	Armament	Ammunition
+2	Good	25mm ChainGun, TOW II Launcher, MAG	300x25mm, 7xTOW II, 3000x7.62mm

M-5 Abrams Recovery Vehicle

Country of Origin: United States

Notes: The M-5 is a recovery vehicle based on the chassis of the first-generation M-1 main battle tank, and retains 85% parts commonality with the M-1A1 (and nearly 100% with the M-1). The turret of the M-1 is replaced with an armored superstructure. To the left of this superstructure is a crane with a capacity of 35 tons and a traverse of 270 degrees. On the front is a dozer blade, and behind that is a winch with a capacity of 45 tons, or 90 tons with block and tackle. The winch has 117 meters of usable cable. An auxiliary winch is provided with a capacity of 2.2 tons and 200 meters of cable. The vehicle has a full set of tools, including basic, wheeled vehicle, tracked vehicle, small arms, heavy ordinance, and excavating tools. An air compressor, a welding and cutting set, a fuel pump, two tow bars, and several lengths of cable, rope, and chains are also provided. The M-5 has an APU to power the equipment; this is an 8.1kW diesel generator. Space is provided for 4 passengers; this is normally for the crew of the tank the M-5 is recovering. The M-5 was not chosen by the US for its recovery needs, but General Dynamics is aggressively marketing it overseas.

Twilight 2000 Notes: This vehicle was taken into US service in late 1996, but only about 150 were ever built.

Merc 2000 Notes: This vehicle entered US service in 2006.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$283,440	D, G, AvG, A	5 tons	68.5 tons	3+4	24	Passive IR, WL/IR Spotlight	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
147/103	30/20	1920	652	Std	T6	HF151Cp HS26Sp HR19

Fire Control	Stabilization	Armament	Ammunition
None	None	M-2HB (C)	1575x.50

GAMESA M-60 VZ

Country of Origin: Spain.

Notes: This is a Spanish combat engineer vehicle based on the M-60A1 tank, also tested by Greece and by Germany and Turkey, though Spain did not receive orders from those countries

The turret of the M-60A1 is replaced by an armored superstructure, beside which is placed a large crane. The superstructure is topped with the M-60A1's machinegun cupola, and retains the M-2HB. The crane is normally equipped with a digging bucket, and has a capacity of 10 tons. A hydraulic hammer, a shearing head, a grapple, or a smaller and more precise digging bucket can replace the head. The large bucket has a digging depth of 2.7 meters, and the arm has a reach of 7.2 meters. The front of the vehicle has a dozer blade (which may be replaced by a mine plow), and is 900 millimeters high and 3.7 meters wide. There is also a main winch in the front of the vehicle with a pulling strength of 30 tons and 90 meters of cable. The pulling strength can be increased to 60 tons by use of block and tackle. The M-60 VZ has an auxiliary generator of 5kW power. The standard tools for a combat engineer vehicle are carried: basic tools, excavating tools, power tools, a welding and cutting set, and an air compressor. The M-60 VZ never passed the prototype stage.

Twilight 2000 Notes: These vehicles were used in large numbers by the Turks, who used them primarily for fortification and road building. The Spaniards also used them in good numbers, but the Germans never used more than the 5 prototypes they ordered for testing.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$428,774	D, A	1.8 tons	51.5 tons	3	19	Passive IR (D), WL Spotlight (C)	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
112/79	31/22	1420	272	Std	T6	HF56 HS15 HR8

Fire Control	Stabilization	Armament	Ammunition
None	None	M-2HB (C)	600x.50, 40xAPERS Mines, 40xAT Mines, Engineer Demo Chest, 40 kg C4.

M-113A3 ESV

Country of Origin: United States

Notes: This vehicle does not exist in real life; however, it is a real concept put forward in the late 1990s to increase the capabilities of the modified M-113s currently employed by US Army combat engineers. It was never more than a drawing-board concept, however.

Twilight 2000 Notes: This was a limited-production combat engineer vehicle produced for US, Belgian, and Canadian forces during the Twilight War. Canadian ESVs were primarily deployed to Europe (about 75% of them, with the remainder kept at home); most US ESVs were deployed to the Middle East, with about 20% used in Korea, and another 20% in Europe. The vehicle consists of a base

M-113A3 chassis topped with a small turret mounting an M-2HB heavy machinegun and a twin launcher for TOW missiles. A TOW missile with a HESH warhead was specifically designed for this vehicle and other combat engineers, for use as a demolition warhead; most of the TOW missiles carried by this vehicle have these HESH warheads. The M-2HB is used for defense or to detonate mines at a distance. An engineer's chest and stowage boxes for plastic explosives, dynamite, or TNT completes the modifications.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$153,171	D, A	1 ton	18.9 tons	2+3	9	Passive IR	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
141/99	30/20/3	464	143	Trtd	T2	TF4 TS4 TR4 HF6 HS4 HR4

Fire Control	Stabilization	Armament	Ammunition
+2	Basic	M-2HB, 2xTOW II Launchers	1000x.50, 6xTOW II, 50 kg Plastic Explosives

M-993 Grizzly Combat Mobility Vehicle

Country of Origin: United States

Notes: Introduced by the US in the early 1990s, the Grizzly is designed to breach obstacles and minefields that normal CEVs cannot. The Grizzly is equipped with a huge dozer blade 4.6 meters wide that is able to dig one meter into the ground at a swipe and excavate 300 cubic meters per hour. The dozer blade is heavily armored and is immune to mine damage. Hull front hits are 50% likely to hit this blade, which has an armor value of 20. Two telescoping arms with buckets are able to reach 10 meters and can excavate 80 cubic meters per hour. The buckets are located on either side on the front hull, and can lift 6.3 tons. Two grapples can be shot 20 meters and can pull 2 tons each. A hydraulic hammer can deliver a 475kg psi blow. An auger can dig a hole 0.6x2.5m in one minute. A lift hook can lift 9 tons. The Grizzly has an integral 60Kw generator. There is a large crane that is able to lift 10 tons, and a winch able to pull 30 tons. The driver and engineer sit in tandem, slightly offset in the front hull. The weapons are in a remote-controlled cupola to the rear of the engineer's hatch.

The Grizzly program was killed in early 2000.

Twilight 2000 Notes: The Grizzly was taken into service in 1997.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$575,969	D, G, AvG, A	2 tons	64 tons	2	26	Passive IR	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
157/110	35/25	1920	662	Std	T6	HF30 HS12 HR8

Fire Control	Stabilization	Armament	Ammunition
None	None	Mk-19, MAG	400x40mm grenades, 1000x7.62mm

Malyshev MT-64

Country of Origin: Ukraine

Notes: The MT-64 AVLB was developed at the same time as the BREM-64; the story is much the same, with only one prototype made so far. Some reports state that the MT-64 prototype has been scrapped, and others say that it is undergoing advanced testing and development. Like the BREM-64, it is based on the T-64A chassis, and is/was intended to be part of a range of vehicles, including a CEV and the BREM-64 ARV. It was designed to support a fleet of newer T-64s that the Ukrainians have in their possession, or other similar-weight vehicles or less.

The bridge is designed to cross bodies of water, ditches and trenches, and in some cases, antitank obstacles. It is an MLC-50 bridge, able to support 50 tons and able to span 24 meters. It is a scissors-type bridge, with a total length of 26 meters, and 3.3 meters wide. Laying and recovering the bridge takes 2 minutes apiece. It can be retrieved from either end. The crew does not need to leave the vehicle or open the hatches to lay or recover the bridge.

The crew is provided with a heater, air conditioner, and NBC Overpressure protection. The MT-64 also has an automatic fire detection and suppression system. On each side, just behind the bumpers, is a cluster of four smoke grenade launchers.

The driver is on the front left; the commander/bridge operator is to his right, in a raised non-rotating cupola with all-around vision blocks. There is no armament. The MT-64 is fitted with a BMS and GPS systems.

The engine is the same 5TDF turbocharged 700 horsepower multifuel engine of the T-64A, along with its automatic transmission. This engine is notoriously unreliable.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$982,688	D, G, AvG, A	400 kg	40 tons	2	39	Passive IR (D)	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor

152/106	42/30	1000	281	Std	T6	HF86Sp HS18Sp HR10
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Sisu KAM-1

Country of Origin: Finland

Seen In: *Jane's* of the early-late 1980s, though it also appears on some web sites (usually as a perfunctory note).

Notes: This Finnish recovery vehicle is a conversion from the T-55 chassis. The KAM-1 was originally an experimental vehicle for the Finnish Army, and the Finnish Army's order was cut considerably, especially after Finland's acquisition of the VT-55A from the Czech Republic. The Finnish Army had a mere 2 KAM-1 ARVs, which were later upgraded to the KAM-2 standard; these seem to have been subject to a never-ending series of field tests until taken out of service in 1989. Many troops in the Finnish Army felt, that in it's KAM-2 configuration, this was a better ARV than the VT-55A. But with lots of VT-55As available from the Czech Republic and Slovakia for little money compared to converting Finland's own T-55s to KAM-type vehicles, the Finnish MoD told the Army, "You get the VT-55As."

KAM-1

On the KAM-1, the turret of the T-55 is removed and replaced with a flat, wide turntable mounting a heavy-duty crane. The crane has a capacity of 22 tons with a reach of 6.7 meters. The winch has a capacity of 36 tons in a straight pull, or 72 tons with block and tackle, and has 140 meters of cable. The vehicle is equipped with a dozer blade, a towing jib and tow bar, ropes, and a wide variety of tools, including wheeled vehicle, tracked vehicle, excavating, small arms, heavy ordinance, basic, and welding. As there is no APU, the engine must be running to power the tools, winches, and crane. The vehicle has the ability to generate smoke by injecting diesel into its exhaust. There is a commander/crane operator's position, with a manually-operated cupola, but there is no weapon mount, as the vehicle's equipment and lockers would block most shots. Power is provided by a V-55 38.88-l 580 horsepower engine with a manual transmission and suspension by torsion bars.

KAM-2

The KAM-1 version upgrades a plethora of features of the KAM-1. The crane's capacity was increased to 30 tons, while the winch's basic pulling ability was increased to 45 tons. A lead/aux winch was added with a capacity of 600 kg, and has 200 meters of cable. A 15kW APU has been added; this can power the tool set as well as the crane or winch (but not both at once). Other details are as the KAM-1 excerpt that the suspension has been beefed up,, the engine has been upgraded to 661 horsepower, the electrical system upgraded, an air conditioner added, and a vehicular NBC pack has been installed, to which the crewmembers may plug in their protective masks. Room for another crewmember has been added, usually giving the KAM-2 another mechanic. The KAM-2 is equipped with a gyrocompass for navigation instead of a simple magnetic compass.

Twilight 2000 Notes: This vehicle was just beginning to be produced before the Twilight War, and there are perhaps 20 of them in all Finland. All of these are the upgraded KAM-2 version.

Vehicle	Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
KAM-1	\$165,013	D, A	2.46 tons	44 tons	2	25	Active/Passive IR (D), WL Spotlight (C)	Shielded
KAM-2	\$173,466	D, A	2.77 tons	44.63 tons	3	27	Passive IR (D), Image Intensification (C), WL/IR Spotlight (C)	Shielded

Vehicle	Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor*
KAM-1	116/81	32/23	812	172	Std	T6	HF65 HS12 HR8
KAM-2	113/79	32/22	812	246	Std	T6	HF65 HS12 HR8

*The dozer blades of the KAM-1 and 2, while primarily simple stabilizing blades, can provide an AV to the front of 4Sp; which area of the front is covered by the blade depends on how high it is raised (lower full, lower glacis, or upper glacis).

KMW Stryker-Launched Assault Bridge (SLAB)

Notes: The SLAB is an AVLB based upon the Stryker chassis. Based on a lighter chassis, it is adequate for something like a Stryker Brigade's vehicles to ford obstacles, but it cannot handle all vehicles in the US Army inventory, being only MLC 50 in capacity. The SLAB, however, would provide the Stryker Brigade or other such light motorized formations with an organic fording capability which can respond to needs faster than heavier AVLBs from a higher echelon. The US Army is currently testing the SLAB for Stryker Brigades, the Marines are also interested in the SLAB, and KMW is offering the SLAB for international sales, both on a Stryker chassis and on other wheeled chassis. The SLAB has a 12-meter single-span aluminum bridge, allowing it to span a gap of 11 meters. The bridge is 1.52 meters wide and weighs three tons.

The SLAB is based on a modified M1132 ESV vehicle, with the addition of deployment arms and machinery and mounting arms. A SLAB may be converted back to an ESV in a little over three hours. Being a modified ESV, the SLAB retains most of the features of the ESV, including its CROWS, the mission computer, the robot controllers, the BMS with GPS and inertial navigation backup, and the ability for the hull and turret to take applique armor. Applique armor is also able to be applied to the front of the vehicle, as the dozer

blade is not carried on a SLAB; however, applique must be "cut to fit" a SLAB due to the bridge-deploying machinery.

Vehicle	Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
SLAB	\$1,269,221	D, A	670 kg	17.97 tons	3	17	Passive IR (C), Image Intensification (D, G, C), Thermal Imaging (G, C), WL Spotlight	Shielded
SLAB w/Bar/Slat	\$1,192,589	D, A	670 kg	18.47 tons	3	16	Passive IR (C), Image Intensification (D, G, C), Thermal Imaging (G, C), WL Spotlight	Shielded
SLAB w/MEXAS	\$1,209,266	D, A	670 kg	20.77 tons	3	20	Passive IR (C), Image Intensification (D, G, C), Thermal Imaging (G, C), WL Spotlight	Shielded
SLAB w/MEXAS & Bar/Slat	\$1,221,007	D, A	670 kg	21.27 tons	3	22	Passive IR (C), Image Intensification (D, G, C), Thermal Imaging (G, C), WL Spotlight	Shielded

Vehicle	Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
SLAB	154/78	43/22	201	132	CiH	W(8)	TF2 TS2 TR2 HF9Sp HS6Sp HR6 (1)
SLAB w/Bar/Slat	162/82	44/22	201	132	CiH	W(8)	TF2 TS2 TR2 HF10Sp HS8Sp HR8Sp (2)
SLAB w/MEXAS	150/75	41/21	201	132	CiH	W(8)	TF2 TS2 TR2 HF15Cp HS10Cp HR7Sp (3)
SLAB w/MEXAS & Bar/Slat	147/74	41/21	201	132	CiH	W(8)	TF2 TS2 TR2 HF15Cp HS12Cp HR8Sp (4)

Vehicle	Fire Control	Stabilization	Armament	Ammunition
SLAB (All)	+2	Fair	M2HB (G), 2xJavelin ATGM Launchers (G)	2000x.50, 2xJavelin Missiles

- (1) Roof AV is 3; Floor AV is 4Sp. The bridge, if mounted on the SLAB, may also be hit on a turret hit – AV of the bridge is 4.
- (2) The bar/slat armor provides a sort of "double spaced armor" effect depending upon the face it hits – if the front or sides are hit, 4D6 damage is removed from the hit's penetration if the Stryker is hit by HE-type rounds. The rear face's bar/slat armor protects the rear face only on 20% of hits – the rest of rear face hits have only an AV of 6. Roof AV is 3, Floor AV is 4Sp. The bridge, if mounted on the SLAB, may also be hit on a turret hit – AV of the bridge is 4.
- (3) Roof AV is 4, Floor AV is 5Sp. Hits from certain angles (front and sides) will have a "composite-spaced" armor effect – divide incoming hits by two for HE-type warhead hits, then subtract 2D6. The bridge, if mounted on the SLAB, may also be hit on a turret hit – AV of the bridge is 4.
- (4) Roof AV is 4, Floor AV is 5Sp. Hits from certain angles (front and sides) will have a "spaced-composite-spaced" effect – divide incoming hits by two for HE-type warhead hits, then subtract 4D6. The bridge, if mounted on the SLAB, may also be hit on a turret hit – AV of the bridge is 4.

VCRT

Country of Origin: Argentina

Notes: This is an Argentine recovery vehicle based on the VCTP armored personnel carrier chassis. In this role, the turret is removed, and in its place is a raised superstructure with a crane with 5-meter reach and capable of lifting 22 tons. The vehicle has a

main winch with 100 meters of cable and capable of pulling 30 tons, and a secondary winch in the rear with a capacity of 10 tons. There is also a rear-mounted dozer blade to brace the vehicle during heavy lifting or winching operations. The VCRT is equipped with basic tools, tracked and wheeled vehicle tools, excavating tools, an air compressor, and a welding and cutting set, as well as a 5kW generator. This vehicle unfortunately fell victim to budget cuts before even a prototype could be produced.

Twilight 2000 Notes: There were perhaps 25 of these vehicles that were ever produced, making them some of the rarest military vehicles of the war.

Merc 2000 Story: These vehicles sold reasonably well worldwide, except to the Argentine military themselves.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$214,166	D, A	1.5 tons	27.5 tons	4	12	Passive IR	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
189/132	40/30/4	640+400	267	Std	T3	HF32 HS6 HR6

Fire Control	Stabilization	Armament	Ammunition
None	None	MG-3 (C)	5000x7.62mm

Airwolf

Nation of Origin: United States

Vehicle Type: Special Operations Helicopter

Notes: Of course, Airwolf is not a real helicopter; it is from the 1980s TV series, *Airwolf*. (Actually, Airwolf is not even technologically possible in the form presented in the TV series; it would be far too heavy to fly due to its weapons load, would not have the interior space it has, could not fly at supersonic speeds or even what would be considered high speeds for a helicopter, and has a sensor fit that simply isn't possible.)

Fictional Notes: Prototypes of this supersonic, heavy lift helicopter were flown as early as the 1980s. Due to high cost, few were ever built, one being operated by the rogue pilots St. John Hawke, Mike Rivers, and Jo Santini. This aircraft was flown as a favor for the CIA by these pilots, in exchange for support and armament. By 2000, this aircraft was still operated out of the American Southwest, on CivGov missions supported by the CIA as best as possible.

Unknown to those pilots, several others were built. Airwolf 2 was destroyed by Airwolf 1 in the mid 1980s. The rest were built shortly before the Twilight War. Airwolf 3 was operated by the DIA, and deployed to the Middle East in support of operations there. Airwolf 4 was operated by Task Force 160, and also deployed to the Middle East in support of US Special Forces, Delta Force, and SEAL teams. Airwolf 6 was deployed as a theatre-level asset to Europe, and went missing in early 2000.

Airwolf uses revolutionary engine and rotor technology to achieve supersonic speeds. Designed primarily for covert intelligence missions, Airwolf has a full camera, night vision, and radar suite, as well as a video camera system that can use the night vision systems. Shotgun microphones are also provided. It carries a laser designator for guiding of its missiles, and a GPS system for navigation, as well as inertial navigations systems. Radar jamming is provided, as well as IRCM systems.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$9,889,800	AvG	500 kg	30 tons	2+1	32	Image Intensification, FLIR, Radar	Shielded

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
2622	656	20/164 10/7 100/70	7000	6599	23000

Combat Equipment	Minimum Landing/Takeoff Zone	RF	Armament	Ammo
Flare/Chaff Dispensers (32), RWR, LWR, ECM, IRCM, Active Jamming, Auto Track, HUD, IR Uncage, Look-Down Radar, Terrain Following Radar, Track While Scan, Target ID	40m	+5	4x30mm Bushmaster II autocannons, 2x40mm Bofors L/70, Triple Weapon Rack, Magazine-Fed	300x30mm, 200x40mm, 3xHellfire ATGM, 3x155mm CLGP, 3xStinger AAM, 2xAIM-4 Falcon AAM

Boeing/Sikorsky RAH-66 Comanche

Country of Origin: United States

Vehicle Type: Scout/Attack Helicopter

Notes: The Comanche was not designed to replace the Apache in US service. Instead, it was designed to supplement it on deep penetration and attack missions. The landing gear and weapons racks retract into the fuselage for stealth flights, but weapon space can be expanded with add-on racks. No ejection seats are provided, and the helicopter is not capable of in-flight refueling. The Comanche is a stealth helicopter; all radar and radar weapons have a one level deficit against it, as do IR-based weapons and equipment. The Comanche program was, unfortunately, killed in early 2004.

Twilight 2000 Notes: The Comanche did not enter service until 1997, and is relatively rare.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$9,197,587	AvG	1.4 tons (Recon Mode), 3 tons (Attack Mode)	3.68 tons (Recon Mode), 5.27 tons (Attack Mode)	2	32	Image Intensification, FLIR, Radar	Shielded

Tr Mov	Com Mov	Mnvr/Acc Agl/Turn	Fuel Cap	Fuel Cons	Ceiling
637	159	15/40	1455	400	6400

Combat Equipment	Minimum Landing/Takeoff Zone	RF	Armament	Ammo
Flare/Chaff Dispensers, Secure Radios, IR Suppression, Laser Designator, Helmet Sight Interface, RWR, Armored Cockpit, GPS, IRCM, ECM, Target ID, Auto Track, TFR	45m	+5	20mm M-197, 6 hardpoints (Recon Mode), 14 Hardpoints (Attack Mode)	500x20mm

AAI RDF/LT

Country of Origin: United States

Notes: The US Army began phasing out the M551 Sheridan in 1978; by 1990, only the 82nd Airborne had fully combat-capable Sheridans (though a small number of Sheridans are still in use for training VISMOD purposes), though the 82nd had already been notified that their Sheridans were going to be phased out too, and by 1996, even the 82nd Airborne had no Sheridans. This left the 82nd Airborne and light infantry divisions with no support vehicles that had any heavy firepower or even halfway-decent armor protection. The Army started the High-Survivability Test Vehicle (Lightweight) (HSTV-L) initiative in the early 1980s to find a vehicle to replace the Sheridan, but ultimately the program came to naught. This is despite the fact that several promising and excellent vehicles resulted from HSTV-L. The HSTV-L program had become a tug-of-war toy for the Pentagon, Congress, and the President, as well as for budget-cutters and those who felt that the 82nd Airborne needed no such vehicle. By 1996, the HSTV-L program had become a very low-priority program, and though it is still funded at a low level (little more than enough to keep it alive), it is acknowledged that no vehicle will result from the program.

AAI RDF/LT Round One – the “LAV-75”

The AAI RDF/LT (Rapid Deployment Forces Light Tank) was one of the earliest vehicles to result from the HSTV-L program, with the first prototypes appearing in 1980. The first version (called by the designers of *Twilight 2000* the “LAV-75,” though the vehicle had no actual military designation) was based on a modified M113A3 APC chassis. The greatest changes were to the suspension, engine, and drive train, as well as having a lower profile and the modifications necessary for a small-turreted vehicle. The hull of the LAV-75 became unrecognizable as something based on the M113A3.

The LAV-75 has armor of welded aluminum. Though armor thickness was increased dramatically, it is still rather thin. Because of this, the LAV-75 is able to take several add-on armor packages, which would be added on later, and could be added quickly and easily enough that it could be done by crews in a combat zone. One of these packages is a set of simple appliqué aluminum plates for the hull and turret roof, and a set of track skirts. (The turret is too small to take appliqué armor, except on the roof.) Another set is an appliqué armor kit similar to the first kit, but the plates and side skirts are made of ceramic/aluminum sandwich armor; this armor is actually lighter than the aluminum appliqué, but costs more. A third method of added protection is a set of lugs for ERA for the glacis, hull sides, and turret roof. The ERA lugs can be attached to either one of the appliqué armor kits. Though offering much better protection, the appliqué armor kits also add a lot of weight, slowing the LAV-75 down. The LAV-75 also cannot be airdropped with those plates in place.

The engine of the LAV-75 is an Avro-Lycoming M650 gas-turbine with an output of 650 horsepower and rapid acceleration. The driver's position used the steering wheel of the M113A3, with pivot steer levers above and in front of the steering wheel. Standard and parking brakes are provided, and the standard brakes and gas pedal are standard pedals. The power pack mounting is innovative; it is accessed from the rear, and can be slid out on rails for service and maintenance. Although the suspension is a modified version of the M113A3's suspension, the tracks are a modified form of those of the M551s.

The turret of the LAV-75 is very low-profile, being less than a meter tall. During development, a bustle rack was added at the rear of the turret for crew equipment and any additional gear and ammunition. The most remarkable part of the turret is the main armament – an ARES 75mm autocannon. This gun uses a revolving breech to speed reloading as well as new case-telescoped ammunition with a combustible case. Recoil is largely taken up by a recoil piston, and the rest by a recoiling breech. The LAV-75 has a two-man crew; the commander doubles as a gunner. The commander has a hatch on the turret roof, with a pintle-mounted M240 machinegun on a contra-rotating cupola. The ARES autocannon has another M240 as a coaxial machinegun. In an unusual twist, the driver can fire the coaxial machinegun in an emergency, though he cannot fire the autocannon. The commander's sights are located in an armored head atop the turret, and consist of an advanced FLIR imager, an image intensifier (primarily for day use), and a standard telescopic coincidence sight as a backup. A ballistic computer and a laser rangefinder are located in the turret, with the laser firing from a coaxial position opposite the coaxial machinegun. The commander/gunner can access these sights from the cupola if needed, though he cannot aim or fire his machinegun from under armor. In another unusual twist, the driver has his own sight head with a FLIR and image intensifier; he can therefore assist the commander/gunner in finding targets in a sort of hunter/killer setup. The driver also has direct vision blocks for normal driving. Both the driver and the commander/gunner can use direct binocular or monocular sight interfaces to access the information from their sight heads, or may view them on an LCD screen.

In 1982, AAI tested a different, enlarged turret on the LAV-75, which I have called here the LAV-75A1. The new turret is a two-man turret, with a gunner and commander; it is not as low-profile as on the LAV-75, but is still fairly small, with the gunner being more in the hull than in the turret. The LAV-75A1 has a separate sight head for the gunner, allowing for a true hunter/killer capability; as a result, the driver has no ability to fire the coaxial machinegun, and does not have the sight head of the LAV-75. The commander and gunner use the same sight interfaces as on the LAV-75, though the driver has a simple day/night vision block. The new turret is large enough to allow the use of appliqué armor on the turret sides and rear (but not on the front). The LAV-75A1 can also take lugs for ERA on the turret sides and front. Other than the increased weight of the new turret, the LAV-75A1 is basically the same as the LAV-75 in detail.

At the same time, AAI introduced another version of the LAV-75A1 – this one with a box on either side of the turret. This version was designed for antiaircraft use, and the boxes on either side of the turret could hold four Stinger or three RBS-70 SAMs. The SAM boxes can be elevated or depressed (both together) independent of or in synch with the main gun and coaxial. The sights for the main gun are also be used to fire the SAMs, and all weapons can be fired together; in this case, the commander fires the SAMs and the gunner fires the main gun and coaxial machinegun. Due to the SAM boxes on the sides of the turret, this version cannot take lugs for ERA on the turret sides, and appliqué armor has to be modified to accommodate the mounts for the SAM launchers. For game

purposes, I have dubbed this version the LAV-75A2.

Another version, which I have dubbed the LAV-75A1E1. It essentially the same vehicle as the LAV-75A1, but uses only a two-man crew. Both crewmembers sit up front with all around vision blocks with night channels. The driver is also sort of a vehicle engineer; while the commander is also the gunner and an auxiliary vehicle engineer; he can also drive the vehicle if necessary. He aims and fires the gun through a downlinked panel. The actual sensors are on the roof of the turret. The idea is that the crew would prove less vulnerable due to both crewmembers being in the low-profile hull, and the turret could also be lower profile. A worry is that the two-man crew would be simply overwhelmed by their tasks.

Round Two – The LAV-75A3

The 13.2-Ton Rapid Deployment Forces Light Tank was designed primarily for export. I have dubbed it the “LAV-75A3” here; it was designed with a different gun, as the ARES 75mm autocannon was deemed too advanced at the time of inception to be exported, and because many potential export customers were still using the old 76mm high-velocity gun or had easy access to its ammunition. The LAV-75A3 was developed in parallel with the LAV-75A1 and A2, with production-level prototypes being available for export in 1982.

The LAV-75A3 is for the most part identical to the LAV-75A1, but the 75mm ARES autocannon is replaced with the 76mm M32 high-velocity gun, which was first used on M41 Walker Bulldog light tank. This gun was also used by the Dutch on their version of the M41, and they had developed an APDSFS-T round for the gun to give it a chance against targets with heavier armor. The LAV-75A3 remained air-droppable and was also able to use the appliqué armor and ERA lugs of the LAV-75A1 and A2. The gas turbine of the first three members of the LAV-75 series is not used; instead, a rather low-power 350-horsepower turbocharged diesel engine, coupled with an appropriate transmission and smaller fuel tanks. The GM 6V-53T engine used was almost identical to that of the M113A3. This was primarily due to US government request; AAI would have preferred to have put a more powerful engine in the LAV-75A3 and standard fuel tanks to make it more attractive to export buyers. As it was, they had none, and Venezuela was the only country to even test the LAV-75A3.

The LAV-75A4 – A Fictional *Twilight 2000* Variant

Fast forward about a decade. The US was looking for a light tank to use as a support vehicle for the 82nd Airborne division as well as a vehicle to supply to other allied countries in a sort of Lend-Lease program – and they needed a vehicle that could be easily put into production, quickly built, and with production farmed out to other companies a la World War 2 production of weapons. AAI stepped up to the plate again; as it was, they still had the production equipment for the earlier LAV-75 variants in storage, and pulled them out in short order and picked up production within 90 days.

Meanwhile, in the intervening time, weapons technology marched on. The new version of the LAV-75, dubbed “LAV-75A4” in its export version and “M20 Ridgway” in US Army parlance, incorporated a number of new features. The armor suite received an upgrade – most of the armor, except for the rear of the vehicle and turret rear – used a new aluminum/ceramic sandwich armor that is light in weight, yet stronger than the LAV-75s original armor. The glacis used a new version of armor based upon the Chobham principle. Side skirts are standard on the LAV-75A4, and the ammunition is contained in explosion and fire-resistant armored bins, as are the fuel tanks. The LAV-75A4 can use appliqué armor similar to that of the other LAV-75s; however, the turret front is not large enough to take appliqué or ERA. The small straight parts of the turret sides can take appliqué, but the turret roof cannot.

The turret used is a remote “casemate” turret, a modified form of that of the Stryker MGS. This turret is armed with an M68A1E4 105mm main gun – a modified form of the gun mounted on many earlier NATO tanks and the first generation of M1 Abrams tanks. This version of the M68A1 uses a low-pressure firing principle, as well as a shorter 45-caliber gun, with no muzzle brake. It has a fume extractor and a muzzle reference system. The main gun is fed by an autoloader, with a capacity of 20 rounds; the rest is carried in the aforementioned armored bins. To the right is a coaxial machinegun. On either side of the main gun are two clusters of four smoke grenade launchers. The driver is in the usual place, but the gunner’s hatch is to the right of the casemate turret. The commander’s position is on a sponson on the left side of the casemate; while he does not have a commander’s machinegun, he is able to fire the limited-traverse coaxial machinegun, which is directly in front of him. The commander and gunner have their own vision heads, allowing them to act in a hunter/killer arrangement. The driver has standard passive IR, with a TV camera at the rear to assist when backing up.

This led to an increase in weight, and a more powerful engine was installed -- derived from an engine used for a heavy tractor/bulldozer, and coupled to an appropriate transmission. This engine is a Caterpillar D-11T DB multifuel engine; the smaller size of the engine allowed larger fuel tanks to be installed. These fuel tanks are self-sealing and use fire and explosion-dampening technology, and the entire vehicle has fire detection and automatic fire extinguishers.

The LAV-75A5 -- Another Fictional *Twilight 2000* Variant

When ARES designed the XM274 75mm autocannon, it also designed a 90mm version of this gun. Only two working versions were developed, and though they performed very well (with far better penetration than the 75mm gun), a lack of onboard ammunition as well as a much smaller elevation ability, as well as the size (the resulting vehicle would be too big to airdrop from a C-130 or C-141), the Army decided to forgo a LAV with the 90mm gun. ARES worked up a version on paper that allowed for more ammunition, but it was too big again for airdrop to work for the 82nd Airborne.

Now to the fictional part. In 1990, increased production of the C-5A and the C-17 made bringing bigger loads to a drop zone tenable, and the Airborne again began to show interest in the LAV-75A5. (The name denoted its kinship with earlier members of the

RDF/LT family, and because there was already a LAV-90 in service). Dubbing it the M27 MacArthur, the vehicles were sent primarily to Light Infantry Divisions, and were also used by the US Marines. Export customers included Taiwan, China (after the Twilight War started), Thailand, Turkey, and Oman. The 90mm ARES M275 autocannon was capable of blasting out a rapid-fire stream of heavy-caliber fire, and could penetrate even a T-62's or early T-64's frontal armor, and virtually any tank from the side and rear. Light armored vehicles, APCs and IFVs, and unarmored vehicles were fodder. Fire from the 90mm gun could also bring down the wall of a four-storey building in quick order, and three or four flechette rounds could decimate an infantry formation. Unfortunately, the LAV-75A5 did not fare well in fights with better-armored tanks, even with its standard composite armor suite.

Unlike the LAV-75, the LAV-75A5 was based on the M113A4 (MTVL) chassis instead of the M113A3, up armored and partially fixing its own shortcomings in its earlier iterations. It was widened and the suspension beefed up. The extra length gave more room for a larger ammunition carousel as well as reloads and special ammunition. The turret was also enlarged, not only to make room for the larger autocannon, but to allow for a small turret bustle to store more ammunition. This unfortunately changes the configuration of the MacArthur, in total makes it a bigger target; however, the turret could be more armored than earlier LAV-75s. It barely slips out the rear door of a C-5 or even a C-17; the long gun also takes up a lot of room inside the bird, but some drop loads carried in addition to LAV-75A5 could be put under the gun. This meant that it saw only limited use by the 82nd Airborne. It did not use most of the appliqué armor packages of the LAV-75 and LAV-75A4; due to the standard composite armor suite of the LAV-75A4, not many appliqué armor types were designed for the MacArthur. Though modifications were often made in the field, the only standard appliqué package was a set of bolt-on aluminum plates bolted on to pre-drilled holes.

Despite the MacArthur's shortcomings, it acquitted itself well in the Twilight War, many surviving to serve into the 2040s.

Experience in the Twilight War

While the 82nd Airborne and some of the light infantry divisions were partially equipped with the original LAV-75 variants (they had a hodgepodge of armor), the LAV-75 variants were primarily supplied to China. The Chinese were only too happy to have more armor, even light armor, and the XVIII Airborne Corps was happy to have a guinea pig for the new, untried vehicles.

By 1995, the picture had become ugly; the ARES 75mm autocannon and the M32 75mm gun were simply unable to penetrate most enemy frontal armor, and caused less-than-expected damage when hitting enemy armor from the sides. The LAV-75 series had proven to be mechanically reliable with maintenance being quite easy, and the LAV-75 series was decently survivable, particularly if used properly and equipped with appliqué armor packages. The high speed of the LAV-75 series proved to be an important tactical asset; they could practically run circles around enemy armor.

The problem was those guns, and the 82nd Airborne, US light infantry divisions, and the Chinese demanded a better gun. This led to the LAV-75A4 version, using the 105mm low-pressure gun. These vehicles, though still deficient in armor, served with distinction in the Twilight War.

Vehicle	Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
LAV-75	\$448,548	D, A	500 kg	13.13 tons	2	9	FLIR (D, C), Image Intensification (D, C)	Shielded
LAV-75 w/Apliqué 1	\$449,900	D, A	500 kg	14.82 tons	2	9	FLIR (D, C), Image Intensification (D, C)	Shielded
LAV-75 w/Apliqué 2	\$454,187	D, A	500 kg	14.1 tons	2	9	FLIR (D, C), Image Intensification (D, C)	Shielded
LAV-75A1	\$455,355	D, A	500 kg	13.43 tons	3	10	FLIR (G, C), Image Intensification (G, C), Passive IR (D)	Shielded
LAV-75A1 w/Apliqué 1	\$457,045	D, A	500 kg	15.15 tons	3	10	FLIR (G, C), Image Intensification (G, C), Passive IR (D)	Shielded
LAV-75A1 w/Apliqué 2	\$461,234	D, A	500 kg	14.41 tons	3	10	FLIR (G, C), Image Intensification (G, C), Passive IR (D)	Shielded
LAV-75A2	\$538,336	D, A	500 kg	13.66 tons	3	11	FLIR (G, C), Image Intensification (G, C), Passive IR (D)	Shielded
LAV-75A2 w/Apliqué 1	\$540,404	D, A	500 kg	15.38 tons	3	11	FLIR (G, C), Image Intensification (G, C), Passive IR (D)	Shielded
LAV-75A2 w/Apliqué 2	\$544,593	D, A	500 kg	14.64 tons	3	11	FLIR (G, C), Image Intensification (G, C), Passive IR (D)	Shielded
LAV-75A3	\$295,074	D, A	500 kg	13.2 tons	3	9	FLIR (G, C), Image Intensification (G, C), Passive IR (D)	Shielded
LAV-75A3 w/Apliqué 1	\$296,765	D, A	500 kg	14.92 tons	3	9	FLIR (G, C), Image Intensification (G, C), Passive IR (D)	Shielded
LAV-75A3 w/Apliqué 2	\$299,351	D, A	500 kg	14.18 tons	3	9	FLIR (G, C), Image Intensification (G, C), Passive IR (D)	Shielded
LAV-75A4	\$388,323	D, A	500 kg	13.03 tons	3	9	FLIR (G, C), Image Intensification (G, C), Passive IR (D)	Shielded

LAV-75A4 w/Appliqué 1	\$390,014	D, A	500 kg	14.16 tons	3	9	FLIR (G, C), Image Intensification (G, C), Passive IR (D)	Shielded
LAV-75A4 w/Appliqué 2	\$392,600	D, A	500 kg	14.01 tons	3	9	FLIR (G, C), Image Intensification (G, C), Passive IR (D)	Shielded
LAV-75A5	\$446,722	D, A	500 kg	15 tons	3	12	FLIR (G, C), Image Intensification (G, C), Passive IR (D)	Shielded
LAV-75 w/Appliqué	\$446,992	D, A	500 kg	15.97 tons	3	12	FLIR (G, C), Image Intensification (G, C), Passive IR (D)	Shielded

Vehicle	Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor*
LAV-75	159/111	40/28	409	264	CiH	T2	TF16 TS4 TR4 HF12 HS4 HR4
LAV-75 w/Appliqué 1	145/102	37/26	409	282	CiH	T3	TF16 TS4 TR4 HF17 HS9 HR4
LAV-75 w/Appliqué 2	152/106	38/27	409	274	CiH	T3	TF16 TS4 TR4 HF16Sp HS8Sp HR4
LAV-75A1	156/109	40/28	409	268	CiH	T2	TF16 TS4 TR4 HF12 HS4 HR4
LAV-75A1 w/Appliqué 1	143/100	36/25	409	286	CiH	T3	TF21 TS9 TR4 HF17 HS9 HR4
LAV-75A1 w/Appliqué 2	148/103	37/26	409	278	CiH	T3	TF20Sp TS8Sp TR4 HF16Sp HS8Sp HR4
LAV-75A2	153/106	38/27	409	274	CiH	T2	TF16 TS4 TR4 HF12 HS4 HR4
LAV-75A2 w/Appliqué 1	142/99	36/25	409	296	CiH	T3	TF21 TS9 TR4 HF17 HS9 HR4
LAV-75A2 w/Appliqué 2	143/100	36/25	409	296	CiH	T3	TF20Sp TS8Sp TR4 HF16Sp HS8Sp HR4
LAV-75A3	119/85	31/22	378	164	CiH	T2	TF16 TS4 TR4 HF12 HS4 HR4
LAV-75A3 w/Appliqué 1	108/77	28/20	378	185	CiH	T3	TF21 TS9 TR4 HF17 HS9 HR4
LAV-75A3 w/Appliqué 2	113/81	29/21	378	176	CiH	T3	TF20Sp TS8Sp TR4 HF16Sp HS8Sp HR4
LAV-75A4	183/128	46/32	409	187	CiH	T2	TF10 TS6 TR4 HF15Cp HS6Sp HR4
LAV-75A4 w/Appliqué 1	168/118	42/29	409	204	CiH	T3	TF10 TS8 TR4 HF20Cp HS11Sp HR4
LAV-75A4 w/Appliqué 2	170/119	43/30	409	202	CiH	T3	TF10 TS8Sp TR4 HF19Cp HS10Sp HR4
LAV-75A5	140/104	37/26	409	302	Trtd	T4	TF19Cp TS12Cp TR7Sp HF24Cp HS15Sp HR6
LAV-75 w/Appliqué	132/98	35/24	409	320	Trtd	T4	TF23Cp TS17Cp TR7Sp HF29Sp HS20Sp HR6

Vehicle	Fire Control	Stabilization	Armament	Ammunition
LAV-75	+4	Good	75mm ARES autocannon, M240D, M240D (C)	60x75mm CTA, 2500x7.62mm
LAV-75A1	+4	Good	75mm ARES autocannon, M240D, M240D (C)	70x75mm CTA, 3500x7.62mm
LAV-75A2	+4	Good	75mm ARES autocannon, M240D, M240D (C), 8xStinger launchers or 6xRBS-70 launchers	60x75mm CTA, 2500x7.62mm, 8xStinger SAM or 6xRBS-70 SAM
LAV-75A3	+4	Good	76mm M32 Gun, M240D, M240D (C)	50x76mm, 2600x7.62mm
LAV-75A4	+4	Good	105mm M68A1E4 gun, M240D	36x105mm, 3500x7.62mm
LAV-75A5	+4	Good	90mm ARES autocannon, M240D, M240D (C)	50x90mm CTA, 5000x7.62mm

*Turret roof AV for the LAV-75, A1, A2, and A3 variants is 3. With Appliqué 1 armor, the turret roof becomes 5, and the hull floor becomes 4. With Appliqué 2, the turret roof and hull roof become 4Sp and the hull floor is 4.

The LAV-75A4, due to the nature of its casemated turret and more advanced armor, takes appliqué a bit differently. Standard hull roof and turret roof armor (what there is of it) is 3; standard floor armor is 5. With Appliqué 1, the hull floor armor is 6Sp, but the turret roof armor cannot take appliqué. With Appliqué 2, the hull roof armor becomes 6Sp and the floor armor becomes 7Sp; again, the turret roof cannot take this appliqué armor.

Begleitpanzer 57mm

Origin: Germany

Notes: The Begleitpanzer 57mm (Support Tank 57mm) is a light tank based on the Marder chassis. It features a 57mm cannon based on a Bofors naval gun and a TOW or HOT ATGM launcher. The main gun is fed by an autoloader, and married to a comprehensive fire control suite and night vision gear. The main gun's autoloader has four feed chutes that each hold 3 rounds, allowing for quick changes in ammunition type fired. Further rounds are carried in the hull. The missile launcher is likewise loaded by an automatic loader, and there is no need for the crew to expose itself outside the armor envelope. The Begleitpanzer carries a small scout group of 3 troops; these troops can also double as impromptu crew members (usually to replenish the main gun's magazine). The driver has a hatch on the front left hull top. The gunner and commander have hatches in the hull roof. The three troops have a ramp in the rear of the vehicle, and there are two firing ports in each side of the hull and one in the rear.

The Begleitpanzer 57mm was never developed beyond advanced prototypes.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$412,580	D, A	500 kg	30 tons	3+3	12	Image Intensification, Passive IR, Thermal Imaging	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
167/117	39/27	650	248	Trtd	T4	TF22 TS14 TR11 HF27 HS12 HR8

Fire Control	Stabilization	Armament	Ammunition
+4	Good	57mm Bofors Gun, TOW II or HOT Launcher, MG-3	148x57mm, 6x TOW II or HOT ATGMs, 5000x7.62mm

BRDM-3

Origin: Russia (Soviet Union)

Notes: Though a version of the BRDM like this was the subject of speculation in the West, it does not seem to actually exist.

Twilight 2000 Notes: This upgrade of the BRDM-2 was only a rumor until shortly before the Twilight War, when a chance encounter by Saudi patrols of the border between Saudi Arabia and Iraq in 1995 resulted in two of them being captured and two destroyed by the LAV-600s the Saudis were using. The BRDM--3 is basically a BRDM2 fitted with a larger turret housing a 30mm 2A42 autocannon and a PKT coaxial machinegun. The combination of speed, small size, and good firepower that the BRDM-3 afforded proved to be a thorn in the side of Allied, Chinese, NATO forces, and a few were even encountered in North Korea. The basic layout is otherwise unchanged from the BRDM-2 model, though there are improvements in stabilization and night vision equipment, as well as the addition of a video camera with a radio uplink to higher headquarters.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$43,892	G, AvG, A	600 kg	7 tons	2+2	2	Passive IR, Image Intensification	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
152/60	38/15/4	290	81	CiH	W(4)	TF5 TS4 TR3 HF6 HS3 HR2

Fire Control	Stabilization	Armament	Ammunition
+2	Fair	30mm 2A42 Autocannon, PKT	210x30mm, 2000x7.62mm

Cadillac Gage LAV-350

Origin: United States

Notes: I personally don't know where this vehicle came from; I can find no mention of it on the Internet or any of my books. It may have been an invention of GDW.

Twilight 2000 Notes: Unlike most Cadillac Gage armored cars, the LAV-350 was type standardized in the US Army and Air Force as the M750. It was primarily used for airfield security, to patrol perimeters of large compounds in hostile areas. The M750 is a variant of the company's LAV-300 series; in this variant, the vehicle has a small turret mounted on the front deck armed with two machineguns. A heavier weapon is mounted on the rear deck behind a set of hatches. There is a hatch on the sloping part of the front deck for the driver, and another hatch on the turret deck. The M750 has a front-mounted winch with a capacity of 9.07 tons, and optionally, air conditioning.

The LAV-300 is powered by a 270-horsepower Cummins VT-504 turbocharged diesel engine, coupled to an automatic transmission. The suspension is 6x6 and of an off-road type, with puncture-resistant tires (though they are not run-flat). Ground clearance is decent and the floor armor is strengthened as a measure against mines. Armor is of Cadillac Gage's proprietary Cadloy (a cadmium/stainless steel/aluminum alloy). The LAV-300 can have added appliqué armor. The LAV-300CS uses a sort of low observable technology, and has the equivalent of IR Suppression, Stealth 0, and half the normal audio signature. The LAV-300 is amphibious after turning on bilge pumps and erecting a trim vane (5 minutes), but speed is quite slow. The driver's position has three vision blocks to the front and one to each side. The center front vision block can be replaced with a night vision block. The vehicle has one small side door on its left side and a rear exit ramp. On each side of the turret are clusters of four smoke grenade launchers.

The turret has two hand fire extinguishers, and the driver has another inside his compartment.

Standard equipment sold with the LAV-300CS includes pioneer tools, basic/vehicle tools, a 19-liter water can, a 19-liter fuel can, a first aid kit, a slave cable, a tow cable, and an engine-driven air compressor. In the front hull is a winch with a 9-ton capacity and 46 meters of cable. A snatch block is also provided.

Vehicle	Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
LAV-350	\$74,109	D, A	968 kg	10 tons	4	6	Passive IR (D, G)	Enclosed
w/Applique	\$75,110	D, A	964 kg	10.7 tons	4	8	Passive IR (D, G)	Enclosed

Vehicle	Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
LAV-350	214/108	60/30/4	265	88	Trtd	W(4)	TF3 TS3 TR3 HF8 HS5 HR4*
w/Applique	203/102	57/29/4	265	88	Trtd	W(4)	TF4Sp TS4 TR3 HF10Sp HS6Sp HR4**

Fire Control	Stabilization	Armament	Ammunition
None	None	2xMAG, M2HB (R)	2400x7.62mm, 525x.50

*Floor AV is 4.

**Roof AV is 3; Floor AV is 5Sp.

Cadillac Gage LAV-600

Origin: United States

Notes: The LAV-600 was begun by Cadillac Gage as a private venture. It was also known for a short time as the V-600 and was also known during development as the LAV-300A1. The LAV-600 features better armor and vision devices than the LAV-300 and LAV-300CS, as well as heavier armament, and has the complete turret of a Stingray tank mounted on it. This vehicle is also in the service of the Thai Army; it was tested in Egypt, though the Egyptians eventually passed on the LAV-600. The LAV-600 was also tested for use with the US Army as the Armored Gun System, but eventually a variant of the Stryker was chosen instead. With no production customers, marketing was discontinued in 2000.

The driver sits on the front left, and at the rear of the hull are two large doors, each of which has a firing port. The LAV-600 has a very efficient Halon automatic fire suppression system and CARC (Chemical Agent Resistant Coating) paint; chemical agents are only 50% likely to stick to the LAV-600 (or any vehicle painted with CARC – CARC is the standard paint for NATO vehicles), and radiological agents are only 60% likely to stick. In addition to the automatic fire suppression system, there is a portable fire extinguishing bottle in the driver's compartment and one in the turret. Run-flat tires are standard. The armor is the standard Cadillac Gage Cadloy alloy; the shape of the hull is similar to the LAV-300CS, but the LAV-600 has heavier armor. The suspension of the LAV-600 can be lowered so that it is transportable in a C-130 Hercules aircraft. The fire control system is that of the Stingray light tank, as is the vision gear. On each side of the turret are eight smoke grenade launchers. The crew is protected by a collective NBC system. The LAV-600 is powered by a Cummins 6CTA 8.3 turbocharged diesel engine with an output of 275 horsepower. The LAV-600 uses a sort of low observable technology, and has the equivalent of IR Suppression, Stealth 0, and half the normal audio signature. Transmission is automatic. Suspension is 6x6, and on the front axle is by coil springs while the rear axles have torsion bars. The two rear axles also have locking, no-spin differentials. Steering is by the front wheels only and is power assisted. In the front hull is a winch with a 9-ton capacity and 46 meters of cable.

The turret provides low-recoil forces, and the gun is a standard M68 105mm gun. Eight rounds of the 105mm ammunition are stored in the turret, along with 500 rounds of 7.62mm ammunition and 100 rounds of .50-caliber ammunition (the latter is usually the belt loaded into the M2HB). The rest of the ammunition is stored in the hull.

Twilight 2000 Notes: When the Twilight War began in earnest, the LAV-600 was picked up for service by the US Marines as a tank destroyer.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$341,146	D, A	700 kg	18.5 tons	4	12	Passive IR (D, C, G), Image Intensification (C, G)	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
139/70	39/19	460	90	Trtd	W(4)	TF32 TS11 TR10 HF12 HS6 HR5

Fire Control	Stabilization	Armament	Ammunition
+4	Good	105mm M68 gun, M240, M2HB (C)	36x105mm, 2400x7.62mm, 400x.50

*Roof AV is 4; Floor AV is 6Sp

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Ferrari Lizard F333E

Country of Origin: Italy

Notes: The Lizard is a very light and basic armored car that was meant primarily as a liaison and reconnaissance vehicle. The vehicle is little more than an armored jeep, but has some extra utility, able to mount machineguns, recoilless rifles, or light ATGM. The vehicle has extra mine protection, and the floor is treated as having the same armor protection as the hull front. Only 15 prototypes were built; I have been unable to determine what happened to them. The driver is in the front, behind bullet resistant windows. The commander and gunner are in the center front of the vehicle, with one hatch on the roof. On each side of the vehicle are large armored doors. The commander may man a light machinegun in the front right of the vehicle, in a ball mount. The Lizard has all-wheel drive, and is powered by a Fiat 113-horsepower engine with a five-speed gearbox and locking differentials. The tires are bullet resistant and run-flat. The two 50-liter gas tanks are self-sealing.

Vehicle	Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
Heavy MG	\$45,557	G, A	230 kg	2.6 tons	3	3	Passive IR (D)	Enclosed
Light MG	\$37,734	G, A	230 kg	2.47 tons	3	2	Passive IR (D)	Enclosed
Auto Rifle	\$39,024	G, A	230 kg	2.35 tons	3	2	Passive IR (D)	Enclosed
Recoilless Rifle	\$45,358	G, A	311 kg	3.33 tons	3	4	Passive IR (D)	Enclosed
ATGM	\$48,984	G, A	291 kg	2.6 tons	3	4	Passive IR (D)	Enclosed

Vehicle	Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
Heavy MG	273/48	76/13	100	44	Stnd	W(3)	HF3 HS3 HR2
Light MG	286/50	79/14	100	44	Stnd	W(3)	HF3 HS3 HR2
Auto Rifle	299/52	83/15	100	44	Stnd	W(3)	HF3 HS3 HR2
Recoilless Rifle	220/39	61/11	100	44	Stnd	W(3)	HF3 HS3 HR2
ATGM	273/48	76/13	100	44	Stnd	W(3)	HF3 HS3 HR2

Vehicle	Fire Control	Stabilization	Armament	Ammunition
Heavy MG	None	None	M2HB (C), Minimi (Bow)	2000x.50, 2000x5.56mm
Light MG	None	None	MG42/59 (C), Minimi (Bow)	2000x7.62mm, 2000x5.56mm
Auto Rifles	None	None	Minimi (C), Minimi (Bow)	6000x5.56mm
Recoilless Rifle	None	None	Folgore w/Optron Sight (C), Minimi (Bow)	8x80mm Rockets, 2000x5.56mm
ATGM	None	None	Milan Launcher, Minimi (Bow)	6xMilan ATGM, 2000x5.56mm

General Dynamics Expeditionary Tank

Country of Origin: United States

Notes: The Expeditionary Tank was designed for use by light and airborne forces as a fire support vehicle and light tank destroyer. It was developed in the 1980s using as many existing components as possible to save money. The vehicle is a very low profile design, with ammunition stored in the hull and the gun contained in a remote casemate. The gun is well stabilized with accuracy rivaling the M1 series of tanks. The Expeditionary Tank has very light armor, but an appliqué armor package is available which can be installed in the field in 15 minutes by the crew, and dramatically increases the protection (and nearly doubles the vehicle's weight). Though tested as a possible replacement for the M551 Sheridan in the airborne armor role and for use in light divisions, it was ultimately rejected for US service (along with every other design meant to replace the Sheridan...)

Twilight 2000 Notes: This was one of the many emergency solutions to the needs of airborne, air assault, and light infantry divisions for lightweight firepower.

Vehicle	Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
Base	\$305,803	D, A	500 kg	19.05 tons	3	7	Thermal Imaging, Image Intensification	Shielded
Appliqué Armor	\$334,307	D, A	500 kg	30 tons	3	9	Thermal Imaging, Image Intensification	Shielded

Vehicle	Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
Base	203/142	47/33	643	202	CiH	T3	TF29 TS13 TR11 HF36Cp HS11Sp HR8
Appliqué Armor	144/101	34/24	643	202	CiH	T3	TF46Sp TS23Sp TR18 HS114Cp HS38Sp HR26

Vehicle	Fire Control	Stabilization	Armament	Ammunition
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(Both)	+4	Good	105mm M68 Gun, MAG, M60D (C)	42x105mm, 5000x7.62mm
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GKN Reconnaissance Vehicle

Country of Origin: Great Britain

Notes: This British vehicle was built with experience gained in the building of the Warrior and Desert Warrior. The vehicle was taken into limited service in Britain, but the primary customers were Middle Eastern, such as Kuwait, Saudi Arabia, Oman, UAE, and Yemen. These vehicles are primarily demonstrators. The armor, though light, is very advanced, and the fire control is likewise advanced. The driver is seated on the front left. The turret is nearly the same as that fitted to the Desert Warrior, but has a more advanced armor package and electronics. The turret also has an optical chemical sniffer installed. The vehicle is fitted with a computerized navigation system with inertial navigation and GPS. Computers also compile information from reconnaissance and relay that information to higher headquarters. Additional sensors are on a mast that can be elevated at the rear of the vehicle.

Twilight 2000 Notes: Production of these vehicles started shortly before the Twilight War, and was quickly stepped up to an accelerated rate.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$375,207	D, A	500 kg	27 tons	3+1	10	Thermal Imaging, Image Intensification, Passive IR	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
136/95	32/22/3	770	194	Trtd	T4	TF24Sp TS18Sp TR18 HF30Cp HS15Sp HR15

Fire Control	Stabilization	Armament	Ammunition
+4	Good	25mm ChainGun, MAG, 2xTOW II ATGM Launchers	630x25mm, 2000x7.62mm, 5xTOW II ATGM

LMT-105

Country of Origin: Great Britain

Notes: This is a light tank based on modified chassis of the Warrior armored personnel carrier. In this role, armor is improved, and the vehicle is topped with a turret mounting a 105mm NATO-compatible gun. The turret was also fitted as a test to the South African Rooikat armored car. The vehicle may be fitted with appliqué armor, for an increase in HF and TF armor of 8, HS and TS armor of 6, and HR and TR armor of 4. This increases weight by 4 tons, and decreases combat movement by 5.

Twilight 2000 Notes: Several prototypes of this vehicle were built before the war, but volume production did not begin until 1998, and it is a rare vehicle, most often employed in British scout units.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$309,229	D, A	600 kg	29 tons	4	11	Thermal Imaging, Active/Passive IR	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
124/87	29/20	770	185	Trtd	T4	TF18Sp TS10Sp TR8 HF22Sp HS8Sp HR6

Fire Control	Stabilization	Armament	Ammunition
+4	Good	105mm NATO Gun, EX-34	32x105mm, 3200x7.62mm

LOHR RPX 6000

Country of Origin: France

Notes: This is another one of those vehicles that the French have offered for export. It can be fitted with a variety of turrets, and several different types were devised. It is light enough to be air dropped, and is fast due to a good power-to-weight ratio.

Twilight 2000 Notes: This French-made vehicle was originally designed for export, but when the Foreign Legion deployed to the Middle East, quantities of this scout car were deployed with them, and used for reconnaissance.

Vehicle	Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
Milan Turret	\$56,716	G, AvG, A	775 kg	6.8 tons	3	4	Passive IR, Image Intensification, WL Spotlight	Enclosed
BTM208 Turret	\$54,109	G, AvG, A	775 kg	7 tons	3	2	Passive IR, Image Intensification, WL Spotlight	Enclosed
20mm Turret	\$151,606	G, AvG, A	775 kg	7.26 tons	3	2	Passive IR, Image Intensification, WL Spotlight	Enclosed
Mortar Turret	\$87,718	G, AvG, A	775 kg	7.83 tons	3	3	Passive IR, Image Intensification, WL Spotlight	Enclosed

Vehicle	Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor					
Milan Turret	204/82	51/21/5	250	132	Trtd	W(3)	TF4	TS4	TR4	HF5	HS3	HR3
BTM208 Turret	200/80	50/20/5	250	132	Trtd	W(3)	TF3	TS3	TR3	HF5	HS3	HR3
20mm Turret	150/60	38/15/4	250	135	Trtd	W(3)	TF4	TS4	TR4	HF5	HS3	HR3
Mortar Turret	188/74	47/18/5	250	132	Trtd	W(3)	TF4	TS4	TR4	HF5	HS3	HR3

Vehicle	Fire Control	Stabilization	Armament		Ammunition		
Milan Turret	+2	None	2xMilan II Launchers, AAT-F1 (C)		10xMilan II ATGM, 1200x7.62mm		
BTM208 Turret	+1	Basic	M2HB, AAT-F1		1675x.50, 2700x7.62mm		
20mm Turret	+2	Fair	20mm M621 Autocannon, AAT-F1		500x20mm, 2000x7.62mm		
Mortar Turret	+2	Basic	60mm Gun/Mortar, AAT-F1		45x60mm, 2700x7.62mm		

M2A0 Walker AMTV (Armored Medical Treatment Vehicle)

Country of Origin: United States

Notes: This vehicle, based on a modified Bradley chassis, allows doctors, nurses, and medics to provide advanced medical care in combat situations. The typical AMTV carries a full range of medical supplies (including a full set of surgical tools, the equivalent of 5 Doctor Medical Bags, enough refills for the personal medical kits of an entire platoon, a full range of drugs, at least 10 units of each blood type, plasma, and IV fluids, and advanced first aid kits). A large refrigerator is carried, as well as a freezer, a 10kW generator for running equipment with the engine off, a defibrillator, Oxygen equipment, medical monitors, and radios to communicate with air as well as ground elements. The crew of the AMTV normally consists of a driver, commander, medic, and nurse, doctor, or physician's assistant.

The M2A0 AMTV is just one of the many projected possible variants of the Bradley chassis, but so far there is no sign of when or even it will ever enter service.

Twilight 2000 Notes: These vehicles were just reaching the US Army's inventory at the start of the Twilight War, and are thus rather rare.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$104,064	D, A	5.5 tons	25.5 tons	4+6 (or 3 stretcher cases)	13	Passive IR	Shielded
r Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor	
137/96	32/22	662	185	Std	T3	HF3 HS3 HR3	

Fire Control	Stabilization	Armament	Ammunition
None	None	M2HB (C)	400x.50

M8 Buford AGS

Country of Origin: United States

Notes: This vehicle falls somewhere between a light tank and a light armored vehicle. It was designed for use by airborne units, able to be airdropped or LAPSEd, and its modular construction allows it to be carried in aircraft. It is based on the chassis of the M2 Bradley, and carries a turret armed with a low-pressure version of the standard 105mm NATO gun. The turret has ammunition storage bins equipped with blowout panels; if a turret (but not a hull) hit results in an ammunition explosion, the Buford is not destroyed and the crew killed. Instead, all the ammunition in the turret (up to 15 rounds) is destroyed, all armament takes minor damage; all sensors take major damage, and each member of the crew takes 50 points of concussion damage. There are three levels of modular armor protection available; these are indicated by slashes for Level 1/2/3 armor. Each configuration has lugs for reactive armor on the HF, HS, TF, and TS. It takes about an hour to take the Buford from Level 1 to Level 2 armor using 4 people, and another hour and a half to go from Level 2 to 3. There has been talk lately of resurrecting the Buford program, but there are no firm plans.

Twilight 2000 Notes: In the Twilight 2000 world, this vehicle program was never killed; it replaced about half of the Sheridans in the 82nd Airborne Division, and also was used by the 101st Air Assault Division, some Light Divisions, and even some heavier formations.

Vehicle	Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
Level 1 Armor	\$272,737	D, A	450 kg	18.05 tons	3	8	Passive IR, Thermal Imaging	Shielded
Level 2 Armor	\$275,053	D, A	450 kg	20.82 tons	3	8	Passive IR, Thermal Imaging	Shielded
Level 3 Armor	\$279,102	D, A	450 kg	23.59 tons	3	9	Passive IR, Thermal Imaging	Shielded

Vehicle	Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor					
Level 1 Armor	190/133	44/31	568	195	Trtd	T4	TF6	TS6Sp	TR4Sp	HF4	HS3	HR4Sp
Level 2 Armor	169/118	39/28	568	195	Trtd	T4	TF6	TS6Sp	TR4Sp	HF8Sp	HS6Sp	HR4Sp
Level 3 Armor	152/106	35/25	568	195	Trtd	T4	TF16Sp	TS16Sp	TR4Sp	HF20Sp		

Armor

HS14Sp HR4Sp

Vehicle	Fire Control	Stabilization	Armament	Ammunition
(All)	+2	Good	105mm LP Gun, MAG, M2HB (C)	30x105mm, 4500x7.62mm, 600x.50BMG

M10A2 Abrams Battle Command Vehicle (BCV)

Notes: This is an M1A2SEP Abrams tank extensively modified for use by battlefield commanders. In this role, the main gun, coaxial machinegun, and ammunition are removed to make room for extensive battle management electronics. A dummy cannon barrel and machinegun barrel are fitted in their place, and the only difference externally between the BCV and a genuine tank are the large amount of antennas the BCV sports. Inside, the turret and hull carry extensive vision gear, including 2nd thermal Imaging and image intensification. The vehicle has a complete suite of three networked Pentium III-class computers built to tougher military specifications to take the vibrations of travel; these computers have a wireless LAN and battle management and land navigation software, including complete maps of the world (by 2000, these are based on 1997 satellite photos. The system has a large LCD touch-screen for input, with a trackball and keyboard as backups. The BCV has a set of at least five radios, from tactical radios to long-range, and for communicating with aircraft and directly with computers on aircraft such as JSTARS. A laser designator is provided, along with software to produce firing solutions for any sort of fire support from mortars to heavy bombers. A secondary function of these vehicles is signal intelligence, with a crew position and computer for an intelligence officer who has a secondary role of intercepting and analyzing enemy broadcasts.

Twilight 2000 Notes: These vehicles, due to their rarity, were initially issued only to US Division and Brigade commanders or Armored and Mechanized Infantry Divisions, and rarely found their way to lower headquarters. They were never encountered in Reserve or National Guard divisions, with the notable exception of the 49th Armored Division's commanding general's vehicle (TX ARNG).

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$627,976	D, G, AvG, A	900 kg	61.5 tons	5	19	2 nd Generation Thermal Imaging, Image Intensification, Passive IR	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
148/104	34/24	1907	516	Trtd	T6	TF161Cp TS36Sp TR30 HF201Cp HS26Sp HR19

Fire Control	Stabilization	Armament	Ammunition
None	None	M2HB (C), MAG (2 nd)	2000x.50, 5000x7.62mm

M41 Walker Bulldog Experimental Variants

Country of Origin: (M41CG) United States; (M41GTI) Germany

Notes: These two versions of the M41 were designed Cadillac Gage (in the case of the M41CG) and Rheinmetall (in the case of the M41GTI) with idea of selling them as kit-type upgrades to countries already using the M41 and desiring to keep them in service for whatever reason. Several countries apparently considered and possibly even tested these upgrades, but ultimately none actually bought the upgrades.

The M41CG is an upgrade package designed by Cadillac Gage. This upgrade basically places the turret of Cadillac Gage's Stingray light tank on the chassis of the M41. To cope with the increased weight, Cadillac Gage also installs a more powerful engine. In addition, radios, electronics, transmission, and electrical components are also upgraded, a fire control computer is installed, and lugs are added to the turret front and sides for ERA. The result is a Walker Bulldog which, while slightly slower, also has firepower far superior to the original M41 series, as well as improved fire control and gun stabilization.

The M41GTI is a German-designed upgrade package using the same sort of idea as the M41CG; however, the replacement turret is taken from the Leopard 1A1. As with the M41CG, Rheinmetall also installs a more powerful engine and fire control computer, as well as upgrading the radios, electronics, electrical systems, and transmission. The gun stabilization is not quite as good as that of the M41CG, but the result is basically the same: a much more powerful version of the Walker Bulldog.

Twilight 2000 Notes: While the M41GTI found a few scattered buyers in various places in the world, the M41CG upgrade found many more -- especially in Taiwan, where almost all of their M41 fleet was upgraded to the M41CG standard.

Vehicle	Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
M41CG	\$261,349	G, A	700 kg	30.5 tons	4	11	Passive IR	Enclosed
M41GTI	\$251,349	G, A	700 kg	30.5 tons	4	11	WL/IR Searchlight, Active/Passive IR	Enclosed

Vehicle	Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
M41CG	107/75	25/18	530	268	Trtd	T4	TF32 TS11 TR10 HF12 HS6 HR6
M41GTI	107/75	25/18	530	268	Trtd	T4	TF30 TS14 TR10 HF12 HS6 HR6

Vehicle	Fire Control	Stabilization	Armament	Ammunition
M41CG	+4	Good	105mm Gun, MAG, M2HB (C)	40x105mm, 5500x7.62mm, 2250x.50
M41GTI	+4	Fair	105mm Gun, MG3, MG3 (C)	40x105mm, 5500x7.62mm

M551 Sheridan/Stingray

Country of Origin: United States

Notes: This was initially a test program by Cadillac Gage for a proposed upgrade to the M551 Sheridan. A few prototypes were built to demonstrate the viability of the concept, but the Army passed on the idea.

Twilight 2000 Notes: The US Army in 1994 began phasing out their M551 Sheridan light tanks from the inventories of all but the 82nd Airborne and 101st Air Assault Divisions. With the development of the M8 Buford in 1995, the M551 seemed to be facing extinction. However, the production rate of the M8 was initially only 300 per year; this left the US military in a terrible bind, because they had promised 100 of the M8s to Taiwan, leaving only 200 Bufords dispersed over the whole of the Army, including the Airborne divisions. A stopgap measure was suggested by fitting Cadillac Gage Stingray turrets to the smaller CG Commando chassis to produce what were nicknamed "Stingray Juniors." These caught the eye of some but the Army never adopted any; however, the Anniston Army Depot began experiments of retrofitting the Stingray turret to a modified M551 body. The result was a vehicle which was hurried into production in late 1996, with an initial rate of conversion of estimated to be 75-150 per year. Anniston Army Depot went further with its conversions by producing spare parts for the M551 Sheridan body; Cadillac Gage provided spare parts for the Stingray turret. Rudimentary changes made to the design included an upgraded armor plate on the underside of the vehicle to protect it from antitank mines. Many of the problems were fixed with the removal of the 152mm Gum/Missile Launcher, especially the rangefinder problem, which was solved by using the CG turret. Experiments were done with adding ERA by the 82nd Airborne while on maneuvers at Fort Irwin.

In the end, the development and adoption of the LAV-75 and continued production of the M8 doomed the would-be adoption of the modified M551 Sheridan/Stingray, and the 50-75 production models which had been converted are spread out across Alabama (Anniston Army Depot), Kentucky (Fort Campbell and Knox), and California (Fort Irwin). Unmodified versions of the M551 with 152mm Gun/Missile Launchers can be found in large numbers at Fort Irwin (some 330 at last count), providing a large amount of spare parts. It is believed that many of these vehicles in California have been deployed to counter Soviet/Mexican-backed attacks into California and Texas. Stock models of the M551 had been converted prior to the war to resemble many Soviet vehicles for use in training at Fort Irwin.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$310,888	D, A	2.26 tons	15.25 tons	4	7	Passive IR, Thermal Imaging	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
112/78	26/18/3	598	92	Trtd	T2	TF32 TS11 TR10 HF16 HS3 HR3

Fire Control	Stabilization	Armament	Ammunition
+4	Good	105mm gun, MAG, M2HB (C)	30x105mm, 2400x7.62mm, 1100x.50

M1072 Clark Fighting Vehicle

Country of Origin: GDLS Multinational Project (primarily developed in the US)

Seen In: Entry on Deviant Art website for the "Warmonger AFV" by Daniel Van In. However, the story has been greatly changed.

Fictional Notes: The Clark (named for the WW II general, Mark Clark) was a revolutionary new fighting vehicle just coming into service with several NATO countries, as well as Israel (who was actually the first country to use it in combat). Though most do-it-all designs do not have much success, the Clark, nicknamed the "Warmonger" by its crews, was quite good at bringing down most fighting vehicles and even many aircraft. Design work began at Dugway Proving ground as sort of a "black project" in the late 1980s, but by 1992, they were in final field testing before being released to the general public notice and military units. By Mid 1993, the Clark was put into a sort of high-rate LRIP production cycle, and issued to several US Army and National Guard divisions and two or three of them began to accompany MAUs subordinate units onshore. Britain and Germany were believed to have received about twenty of them each, and the Dutch and Belgians also had a number of them on hand. The Canadians had a large force of nearly 50 Warmongers in service at the beginning of the Twilight War. The US, between the Army and Marines, may have had as many as 200 in service for the start of the Twilight War. The Israelis, the first to use the Clark in combat on the Golan Heights in 1993, had some 60 of them, as they got on the bandwagon early and took part in much of the development and testing program.

The Clark was envisioned to be a quick, agile, lightweight vehicle which could be called upon to take on all comers if necessary. Though the base chassis was that of the M2A3 Bradley, the engine was a vastly improved version of the Bradley's engine developing 902 horsepower, and the chassis was highly-modified and much more heavily-armored. The primary armament was a pair of M61A2 Vulcan rotary cannons; though the turret looked like it may be large and roomy from the outside, the interior was in fact packed with ammunition for the Vulcans and reloads for the missiles, and the crew positions were actually quite tight. The autocannons could usually be counted upon to take on most unarmored vehicles and light armored vehicles, as well as low-flying helicopters, aircraft and UAVs; the quartet of Hellfire and Scorpion missiles on each side allowed the Clark to take on more meaty targets if the conditions were right. Just to round out, a semi-RWS M2HB mounting on the commander's hatch could take on close infantry; the mounting allowed the commander to aim, fire, and reload the M2JB from under armor.

Sensorwise, the Clark is also well endowed, ranging from an IFF interrogator to an AESA identification and targeting radar in the front of the turret which is useful against air and ground targets, and FLIR and 2nd-Generation Image Intensification as backups for the radar. The AESA radar is also used to guide the Hellfire ATGM if armed with radar-guided Hellfires, and the Clark also has a laser rangefinder/designator for use with laser-guided Hellfires. Of course, the laser can also be used for general rangefinding duties, as well as to guide other laser-guided munitions fired from other vehicles, helicopters, and aircraft. The Clark uses a pair of FLIR/Image Intensifier heads, allowing the Clark crew to operate in a hunter/killer mode or to fire the autocannons at one target while firing the missiles of the commander's machinegun at separate targets.

In addition, the Clark has a comprehensive computer suite, ranging from three separate fire control computers (for the guns, missiles, and commander's machinegun) to a full BMS with vehicle state computer.

The driver is on the front right side, and he uses controls more like those of an M1 Abrams rather than those of a Bradley. This allows for a faster maneuvering response. The transmission is automatic with a manual backup and is related to the Bradley's, but more advanced with faster gearshifting possible. The position on the turret deck where one might find another hatch is instead occupied with a Soft-kill APS system. The turret is occupied by the gunner, an assistant gunner, and the commander, with all crewmembers exiting and entering the vehicle through the commander's or driver's hatches. Nice touches are the ration heater built in (enough to heat four entrees or two canned beverages), and a 40-liter chilled water tank to the right rear of the driver's compartment. The vehicle is NBC sealed, as well as being air conditioned and heated. On each forward side of the turret are four smoke grenade launchers, and of course the APS has a magazine of smoke grenades for its use.

An unusual feature of the Clark is a polyvinyl strip round the turret ring; this was to predetonate HE-type rounds in what would be a sensitive area to be hit, but in practice, it quickly got torn and broken and gave the danger of jamming the turret, so most crews removed it almost as soon as they arrived in the marshalling area of the combat zone they were assigned to or soon after their first battle was over.

Enemy troops detested the Clark, with its fast-elevating guns and missile launchers, quick-rotating turret, and general accuracy of fire. There were even some enemy tankers who didn't want to tangle with a Warmonger, especially in open terrain – the Hellfire missiles were often in range of enemy tanks before the enemy tanks were in range for even an ATGM shot.

M1072A1 Clark

When this limited-issue variant of the Clark began being built, crews and commanders immediately started to finagle as many of them as possible to replace their M1072 Clarks. It was quickly dubbed the Warmonger 2 by the crews that were assigned to them, but in practice were generally also called Warmongers. In short, the Warmonger 2 is armed with 30mm M1980 (GAU-13/A) four-barrel gatling guns instead of the Vulcans of the Warmonger 1. The M1980 is a highly-modified version of the A-10's GAU-8A gun – with heavy-duty recoil buffers and barrels one-half the length of the GAU-8A. Nonetheless, the M1980 can fire all of the ammo selection of the GAU-8A. Internal fittings inside the turret had to be drastically modified to accommodate the M1980s ammunition, and not only the recoil buffers, but the mountings had to be basically replaced with new systems, and the fire control computers for the gun also had to be modified. Despite the redesign, the Warmonger 2 is not able to carry anywhere near the ammo load of the Warmonger 1, something Warmonger 1 crews felt was a deficit compared to their vehicles. The AESA radar on the M1072A1 also had to be modified to accommodate the additional range of the M1980 autocannons. Some say that the louder, more vibratory hammering of the autocannons led to greater crew fatigue, and the louder sound of the guns firing also caused hearing loss. Warmonger 2 crews said "it's something you get used to." The mounts for the electronics also had to be modified to take up the strain of the greater vibrations caused by the M1980 autocannons. Whatever its problems, the Warmonger 2 was much harder-hitting than the Warmonger 1, and the addition of the capability to fire "silver bullet" ammunition was definitely a plus against armored vehicles, and the larger filling of the HE round easily produced greater casualties against infantry and unarmored vehicles. Unfortunately, the GDLS production facilities in both the US and Canada were nuked in the TDM, after only about 10% Warmonger 2s were built as opposed to the Warmonger 1's total, and most went to NATO forces in Europe and Army and National Guard units operating inside the US, and Canadian Land Forces units.

Vehicle	Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
M1072	\$2,089,660	D, A	600 kg	46.92 tons	4	42	Image Intensification (D), Day/Night Backup Camera (D), 2 nd Gen Image Intensification (G, C), FLIR (G, C), AESA Radar (40 km Detection, 13 km Targeting (G))	Shielded
M1072A1	\$2,257,416	D, A	526 kg	47.89 tons	4	44	Image Intensification (D), Day/Night Backup Camera (D), 2 nd Gen Image Intensification (G, C), 2 nd Gen FLIR (G, C), AESA Radar (45 km Detection, 20 km Targeting) (G)	Shielded

Vehicle	Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor*				
M1072	157/110	44/31	662	147	Trtd	T4	TF48Sp	TS13Sp	TR6	HF40Sp	HS16Sp
M1072A1	155/109	44/31	662	149	Trtd	T4	TF48Sp	TS13Sp	TR6	HF40Sp	HS16Sp
										HR8	

Vehicle	Fire Control	Stabilization	Armament				Ammunition	
M1072	+5	Good	2x20mm M61A1 Vulcan Gatling Guns, 8xHellfire Missiles, 8xFIM99 Scorpion SHORADs, M2HB (C)				4000x20mm, 12xHellfire Missiles, 8xScorpion SAMs, 2000x.50	
M1072A1	+5	Good	2x30mm M1980 Avenger II Gatling Guns, 8xHellfire Missiles, 8xFIM99 Scorpion SHORADs, M2HB (C)				2500x30mm, 12xHellfire Missiles, 8xScorpion SAMs, 2000x.50	

OTO Melara R3 Capraia

Country of Origin: Italy

Notes: This vehicle looks like something out a science fiction movie, with its long, low, slender silhouette. The chassis is based on that of the Gorgona, while the body is long and wedge shaped, with armor sloped on all sides. The driver is at the front with windows directly in front and to the sides; he has a hatch on top of his compartment. The commander's position is to the rear and right of the driver's position. To the rear is a hatchway that can be fitted with a variety of weapons stations or light turrets. On each side of the hull is another door, and to the front of those doors is a firing port with vision block.

The T 12.7 FA has an externally mounted M2HB machinegun that may be aimed and fired from within the vehicle. The T 7.62 FA is the same, but has a lighter machinegun. The T 20 FA-HS is also similar, but uses a 20mm autocannon. The Folgore x2 FA has two Folgore recoilless rifles and a light machinegun; these cannot be aimed or fired from within the vehicle. (The Folgore are treated as being mounted on a tripod with optronic sight.) The T 106 x2 FA is similar to the Folgore vehicle, but uses two M40A2 106mm recoilless rifles and has no machinegun. As might be guessed, the TOW FA has a TOW II system.

The R3 was never actually put into production. The prototypes were written off on OTO Melara's taxes, becoming worn out.

Vehicle	Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
T12.7 FA	\$30,122	D, A	269 kg	3.5 tons	3+2	3	Passive IR (D)	Shielded
T7.62 FA	\$25,349	D, A	269 kg	3.47 tons	3+2	3	Passive IR (D)	Shielded
T20 FA-HS	\$71,448	D, A	285 kg	3.7 tons	3+2	3	Passive IR (D, G)	Shielded
Folgore x2 FA	\$67,148	D, A	294 kg	3.5 tons	3+2	3	Passive IR (D)	Shielded
T106 x2 FA	\$81,246	D, A	324 kg	3.9 tons	3+2	3	Passive IR (D)	Shielded
TOW FA	\$86,061	D, A	273 kg	3.9 tons	3+2	4	Passive IR (D, G)	Shielded

Vehicle	Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor					
T12.7 FA	195/34	54/10/4	80	28	CiH	W(2)	TF2	TS2	TR2	HF4	HS3	HR3
T7.62 FA	196/34	54/10/4	80	28	CiH	W(2)	TF2	TS2	TR2	HF4	HS3	HR3
T20 FA-HS	186/33	52/9/4	80	28	CiH	W(2)	TF2	TS2	TR2	HF4	HS3	HR3
Folgore x2 FA	195/34	54/10/4	80	28	CiH	W(2)	TF1	TS1	TR1	HF4	HS3	HR3
T106 x2 FA	179/31	50/9/4	80	28	CiH	W(2)	TF1	TS1	TR1	HF4	HS3	HR3
TOW FA	179/31	50/9/4	80	28	CiH	W(2)	TF1	TS1	TR1	HF4	HS3	HR3

Vehicle	Fire Control	Stabilization	Armament		Ammunition	
T12.7 FA	+1	Basic	M2HB		500x.50	
T7.62 FA	+1	Basic	MG42/59		500x7.62mm	
T20 FA-HS	+2	Fair	20mm Oerlikon KAA Autocannon		300x20mm	
Folgore x2 FA	+1	None	2xFolgore Recoilless Rifles, MG42/59		10x80mm Rockets, 400x7.62mm	
T106 x2 FA	+1	None	2xM40A2 106mm Recoilless Rifles		10x106mm Rockets	
TOW FA	+2	None	TOW II Launcher		8xTOW II ATGM	

PT-57

Origin: Russia (Soviet Union)

Notes: This vehicle appears to have existed only on the drawing board, and no working examples were actually produced.

Twilight 2000 Notes: This variant of the PT-76 light tank is so rare that it has almost never been seen in the hands of normal troops. If it is encountered, it is almost certain that one has encountered airborne or Spetsnaz troops. In this version, the normal turret of the PT-76 has been replaced with one mounting a 57mm S-40 autocannon. The PT-57 is meant for heavy, rapid-fire support

of infantry and antiaircraft use.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$75,000 (-/-)	D, A	800 kg	13.5 tons	3	7	Passive IR	Enclosed
Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor	
94/66	22/15/2	250+180	80	Trtd	T3	TF12 TS4 TR4 HF12 HS4 HR4	
Fire Control	Stabilization	Armament			Ammunition		
+3	Fair	57mm S-40 Autocannon, PKT			60x57mm, 1000x7.62mm		

PT-90

Country of Origin: Israel

Notes: This is an Israeli modification of the PT-76. Original modifications were made for Indonesia, which has a number of old PT-76s. In the PT-90, the 76mm main gun is replaced by a Cockerill 90mm NATO gun, the coaxial machinegun is replaced by a MAG, a commander's machinegun has been added, and the engine is replaced with a version of the one used in the M113 series of armored personnel carriers. The gun has been stabilized and new fire control equipment is added. As the new engine is smaller and lighter, more fuel has been added. Primarily designed as an upgrade package for countries already using the PT-76, the PT-90 has not as yet (officially) received any interest.

Twilight 2000 Notes: During the Twilight War, captured PT-76s were modified to this standard and used by the Israeli military, and some modifications were done for the Egyptians.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$179,509	D, A	325 kg	15.35 tons	3	8	Passive IR, Image Intensification	Shielded
Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor	
126/88	32/22/3	250+180	88	Trtd	T3	TF10 TS6 TR6 HF12 HS4 HR4	
Fire Control	Stabilization	Armament			Ammunition		
+3	Good	90mm Cockerill Gun, MAG, MAG (C)			40x90mm, 2000x7.62mm		

PT-100

Country of Origin: Russia (Soviet Union)

Notes: This vehicle does not exist in real life; it is the idea of a friend of mine, [Antti Henttu](#). I have provided a small back story, however. It should be noted that Rafael of Israel has come up with a PT-76 upgrade turret kit that uses an updated version of the 100mm gun of the T-55 along with a greatly-enhanced fire control and night vision suite as well as improved armor protection, but the PT-100 presented there is not the vehicle presented here.

Twilight 2000 Notes: This vehicle is the answer to US light tanks such as the M8 Ridgeway and Stingray. It entered service in about 1994, but was not seen in the hands of normal troops. If one encounters this vehicle, one has almost certainly encountered airborne, Spetsnaz, or Naval Infantry troops. The PT-100 is basically a PT-76 chassis with the turret of a BMP-3 IFV mounted in place of the normal turret. The vehicle is meant to protect armored personnel carriers of those types of troops. The BMP-3 turret may use BMP-3 appliqué armor.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$377,602	D, A	500 kg	14.3 tons	3	8	Passive IR, Image Intensification	Enclosed
Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor	
104/73	24/17/3	250+100	58	Trtd	T3	TF11 TS4 TR4 HF12 HS4 HR4	
Fire Control	Stabilization	Armament			Ammunition		
+1	Good	100mm rifled gun, 30mm 2A24 autocannon, PKT			40x100mm, 6xAT-10 ATGM, 500x30mm, 2000x7.62mm		

RPX 90

Country of Origin: France

Notes: This is another one of those interesting vehicles that never made it past the prototype stage. The RPX 90 is a 4x4 light wheeled chassis mounting a MARS casemate turret with a 90mm gun. It was intended to be a reconnaissance vehicle with a low silhouette and excellent mobility. The driver is in the center front of the vehicle with bulletproof windows to the sides and front. The commander and gunner sit to either side of the casemate, and they have a hatch on the left side of the hull.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
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\$214,892	D, A	400 kg	10 tons	3	6	Passive IR, Image Intensification	Shielded
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Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor	
186/74	47/19	200	84	CiH	W(3)	TF6 HS6 TR6 HF8 HS4 HR4	

Fire Control	Stabilization	Armament		Ammunition
+3	Fair	90mm Giat Super 90, AAT-F1		60x90mm, 2000x7.62mm

RPX 3000

Country of Origin: France

Notes: The French are aggressively shopping around this vehicle, with no official orders yet.

Twilight 2000 Notes: This is a light scout car that was ordered into production by the French during the Twilight War for internal security work and patrolling of the "Dead Zone" along the Rhine River. It was known to be a quick and maneuverable vehicle that was a thorn in the side of many a refugee.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$27,996	D, A	300 kg	3.5 tons	2+2	5	Passive IR	Enclosed

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor	
252/100	63/25/7	120	46	Std	W(2)	HF3 HS2 HR2	

Fire Control	Stabilization	Armament		Ammunition
None	None	AAT-F1 (C); M2HB, Mk-19, or Milan II Launcher		1600x7.62mm; 950x.50, or 300x40mm, or 6xMilan II

Thyssen-Henschel TH-200/400/800

Notes: The TH-200/400/800 series are German scout cars designed for battlefield reconnaissance. They are loosely based on the Spahpanzer Luchs and are a private venture instead of being developed to any Army standard. The TH200 has a 4x4 suspension, the TH400 6x6, and the TH800 8x8. The suspension uses a double trailing arm independent suspension for each wheel. These vehicles have power steering and power brakes, The kinetic properties of the suspension grant the TH series a gentle ride over all but the roughest of terrain. In addition, the TH series does not use rigid axles, further smoothing out the ride. The TH series is equipped with wide, low-pressure tires and run-flat tires, increasing traction in soft terrain.

Their all-welded steel armor has protection against small arms, medium machineguns, and shell fragments, but they are vulnerable, like most vehicles in this class, against LAWs, ATGMs, and heavy machineguns and rifles. Appliqué armor is available, as are lugs for ERA on the hull front, turret front and turret sides. The crew is protected by an automatic fire detection and extinguishing system in the power pack compartment, turret, and driver's compartment. The crew is further protected by an NBC Overpressure system, which also cleans the air for the TH series' air conditioning and heating. The series is equipped with a video camera attached to the roof of the turret and data-capable radios; the pictures from the video camera can be sent over radio to higher headquarters. The vehicles have a Radiac meter and an optical chemical sniffer. The vehicles are equipped with a ruggedized laptop computer. Stats below are estimates and examples and TH has envisioned many possible variants.

The TH200 uses a 4x4 suspension and is similar to the Panhard AML in concept, if not design. It mounts a 90mm gun in a roughly circular turret with a rear bustle for ammunition stowage. The bustle is separated from the turret by armored blast doors and has external blow-off panels. A hit on the bustle's ammunition, if the ammunition explodes, does not automatically destroy the vehicle, in a manner similar to the M1 Abrams' protected turret ammunition supply. The bustle stores 22 rounds of the TH200's ammunition supply, with the rest stored in the hull. The TH200 is light in weight and can be taken as a sling load by heavy lift helicopters or airdropped. The TH200 is also fully amphibious. The TH200 prototype is equipped with a 225-horsepower diesel engine. The TH200 is equipped with a laser rangefinder on the roof of the turret.

The TH400 is 6x6 and is heavy enough that it sacrifices its ability to be sling-loaded and conduct amphibious operations, though it can ford up to 1.2 meters. The TH400 features a dramatic increase of the armor suite, and also has applique designed for it and also has lugs for reactive armor on the hull front, turret front, turret sides, and hull sides. The TH400 also has a dramatic increase in firepower, with a 105mm NATO-standard gun, coaxial machinegun, and a machinegun on a skate mount at the commander's hatch. The TH400 has a central tire pressure regulation system in addition to having the standard wide and run flat tires. The powerpack is at the rear and is a modular installation; the TH400 is able to easily take a variety of powerpacks, though the prototype uses a 435-horsepower diesel. Of the TH series, the TH400 has the least ground pressure, and has the least problem in soft ground or snow.

The TH800 is 8x8 and uses a powerful 650-horsepower engine, giving it decent agility despite its high weight. The TH800 is envisioned as a fire support vehicle, reconnaissance vehicle, and tank destroyer, and it mounts a heavier 120mm NATO-standard gun and even heavier armor than the TH400. Other weapon mountings are being considered, but it should be known that no prototype of the TH800 has yet been built and the weight and armament listed below is an estimate and example,

Thyssen-Henschel is still shopping this series around, but there are no takers as of yet. Criticisms include high weight and high cost; even the *Twilight 2000* cost is high for a vehicle in its class.

Twilight 2000 Notes: As this vehicle has just entered production in 1997, quantities of them were never high.

Vehicle	Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
TH-200	\$400,233	D, A	472 kg	9.25 tons	4	8	Thermal Imaging (G, C), Image Intensification (G, C), Passive IR (D)	Shielded
w/Applique	\$403,929	D, A	466 kg	11.6 tons	4	8	Thermal Imaging (G, C), Image Intensification (G, C), Passive IR (D)	Shielded
TH-400	\$521,673	D, A	601 kg	24.5 tons	4	16	Thermal Imaging (G, C), Image Intensification (G, C), Passive IR (D)	Shielded
w/Applique	\$525,833	D, A	593 kg	28.4 tons	4	16	Thermal Imaging (G, C), Image Intensification (G, C), Passive IR (D)	Shielded
TH-800	\$616,461	D, A	778 kg	35 tons	4+2	20	Thermal Imaging (G, C), Image Intensification (G, C), Passive IR (D)	Shielded
w/Applique	\$622,285	D, A	768 kg	40.5 tons	4+2	20	Thermal Imaging (G, C), Image Intensification (G, C), Passive IR (D)	Shielded

Vehicle	Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
TH-200	183/93	51/26/5	520	83	Trtd	W(4)	TF5 TS4 TR3 HF6 HS3 HR2
w/Applique	154/78	43/22/4	520	83	Trtd	W(4)	TF13Sp TS10Sp TR7 HF14Sp HS9Sp HR6
TH-400	151/76	42/21	520	147	Trtd	W(5)	TF19 TS12 TR11 HF24 HS10 HR8
w/Applique	135/69	38/19	520	147	Trtd	W(5)	TF27Sp TS18Sp TR15 HS32Sp HS16Sp HR12
TH-800	157/78	43/22	520	227	Trtd	W(6)	TF22 TS15 TR12 HF28 HS13 HR9
w/Applique	140/70	38/20	520	227	Trtd	W(6)	TF30Sp TS21Sp TR16 HF36Sp HS19Sp HR13

Vehicle	Fire Control	Stabilization	Armament	Ammunition
TH-200	+4	Good	90mm Cockerill Mk 3 Gun, MG3	30x90mm, 2000x7.62mm
TH-400	+4	Good	105mm M68 Gun, MG3	45x105mm, 4000x7.62mm
TH-800	+4	Good	120mm Rheinmetall Gun, MG3, MG3 (C)	50x120mm, 5000x7.62mm

Vextra 105

Country of Origin: France

Notes: This is the scout car variant of the Vextra 25 armored personnel carrier, designed to replace the AMX-10RC in French service and the Luchs in German service. The turret is replaced with a much larger one mounting a 105mm NATO gun.

Twilight 2000 Notes: Perhaps 25 of these vehicles had been produced for each army before production stopped for Germany. French vehicles were largely deployed to the Middle East.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$373,574	D, A	400 kg	34 tons	4	10	Thermal Imaging, Passive IR, Image Intensification	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
152/60	38/15	580	234	Trtd	W(6)	TF16Sp TS10Sp TR10 HF20Sp HS7Sp HR7

Fire Control	Stabilization	Armament	Ammunition
+4	Good	105mm M68 gun, AAT-F1 or MG-3	45x105mm, 2800x7.62mm

LOHR VPX 5000

Country of Origin: France

Notes: This is another of those neat little vehicles that never quite made it into production. The VPX 5000 is a small scout APC, similar in concept to the US M114, but with a more versatile chassis able to mount several weapons mixes. The MCT (MILAN Compact Turret) is a small mount for two MILAN ATGM launchers. The version with a HOT Launcher has a simple external HOT ATGM. THE MASCOT/MILAN has an externally-mounted remote machinegun and an external MILAN launcher. The BTM208 turret has two machineguns. It is very light and has reasonable performance, but nothing outstanding (other than speed), and that probably led to its demise.

Vehicle	Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
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MCT Turret	\$55,635	D, A	300 kg	5.5 tons	3	2	Passive IR	Enclosed
HOT Launcher	\$36,521	D, A	300 kg	5.48 tons	3	2	Passive IR	Enclosed
MASCOT/MILAN	\$38,886	D, A	300 kg	5.51 tons	4	2	Passive IR	Enclosed
BTM208 Turret	\$18,392	D, A	300 kg	5.5 tons	3	2	Passive IR	Enclosed

Vehicle	Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
MCT Turret	224/157	52/37	220	53	CiH	T2	TF1 TS1 TR1 HF4 HS2 HR2
HOT Launcher	225/158	52/37	220	53	Stnd	T2	HF4 HS2 HR2
MASCOT/MILAN	224/157	52/37	220	53	Stnd	T2	HF4 HS2 HR2
BTM208 Turret	224/157	52/37	220	53	CiH	T2	TF2 TS2 TR2 HF4 HS2 HR2

Vehicle	Fire Control	Stabilization	Armament	Ammunition
MCT Turret	+1	None	2xMILAN Launchers	8xMILAN ATGM
HOT Launcher	None	None	HOT Launcher	6xHOT ATGM
MASCOT/MILAN	None	None	MILAN Launcher, AAT-F1	6xMILAN ATGM, 500x7.62mm
BTM208 Turret	+1	Basic	M2HB, AAT-F1	300x.50, 500x7.62mm

Ze'ev Mobile Armored Gun System (MAGS)

Notes: This vehicle does not exist in real life; it is the invention of Frank Frey, designer of many of the *Twilight 2000* modules.

Twilight 2000 Notes: The Ze'ev was designed and built in Israel in the late 1980's as a low-cost alternative to the Merkava Mk 1 MBT. It carries its main armament in a remote-control turret with an autoloader system. The commander, driver, and gunner ride in the chassis. They each have a separate hatch on the chassis deck.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$326,527	D, A	400 kg	21 tons	3	9	Active/Passive IR, Thermal Imaging	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
156/109	36/26	650	179	CiH	T4	TF13Cp TS14 TR8 HF16Cp HS12Sp HR6

Fire Control	Stabilization	Armament	Ammunition
+4	Good	105mm Gun, MAG, MAG (C)	40x105mm, 2500x7.62mm

Ze'ev MAGS-60

Notes: This vehicle does not exist in real life; it is the invention of Frank Frey, designer of many of the *Twilight 2000* modules.

Twilight 2000 Notes: This is a variant of the basic system mounting a 60mm hypervelocity autocannon in a remote-controlled turret.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$325,615	D, A	400 kg	19.33 tons	3	8	Active/Passive IR, Thermal Imaging	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
154/108	36/25	650	128	CiH	T4	TF13 TS14 TR8 HF16 HS12Sp HR6

Fire Control	Stabilization	Armament	Ammunition
+4	Good	60mm HVMS, MAG, MAG (C)	180x60mm, 2500x7.62mm

Iraqi MT-LB 120mm Mortar Carrier

Country of Origin: Iraq

Notes: This is a modification of the standard MT-LB APC. The vehicle carries a battery of 120mm M-43 mortars, one in the rear inside the armor and 4 mounted externally as the rear. All mortars fire towards the rear of the vehicle; they are in fact attached to the rear of the vehicle, except for one which is mounted within the vehicle. The MT-LBs load carrying ability is used primarily to carry the large amount of crew required to supply these mortars, and the vehicle is normally followed by other MT-LBs carrying the vast amount of ammunition required to feed the mortars. Doubtless the vehicles would have to be followed around by ammunition supply vehicles. There is no evidence that this vehicle was ever mass-produced; in fact, it may have been built simply to impress Saddam Hussein. It is an interesting "what-if."

Twilight 2000 Notes: The 5 examples of this vehicle were quickly fielded during the Twilight War, and just as quickly abandoned as impractical. Three were known to have been converted back to conventional single mortar carriers, and 2 were destroyed before this could be done.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$168,355	D, A	300 kg	13.9 tons	12	16	Headlights	Enclosed

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
117/82	25/20	450	88	Std	T3	HF5 HS2 HR2

Fire Control	Stabilization	Armament	Ammunition
None	None	5xM-43 120mm Mortars, PK (C)	20x120mm, 5000x7.62mm

Hagglunds Pbv-401GRK

Country of Origin: Sweden

Notes: I believe that prototypes of this vehicle were built as experiments, but production vehicles were never actually built.

This mortar-carrying vehicle is another Swedish modification of the MT-LB. The basic MT-LB chassis is externally similar, though it does have a large turret at the rear of the vehicle. This turret is a variant of the CV-9040's turret, but mounts a 120mm breech-loading mortar with a coaxial machinegun. On either side of the turret is a line of four smoke grenade launchers. Atop the turret are hatches for the commander and gunner, while the two loaders enter and exit the vehicle primarily through the gunner's hatch. Internally, it is quite cramped, with ammunition stored in front where the commander's seat used to be and at the rear (making the still-present rear door virtually useless). The mortar is in the turret, and is just rear of the center of the vehicle. The driver is at the front left of the vehicle. Laying the mortar is generally done with an MBC, though legacy equipment is still carried. Likewise, though the vehicle has an additional long-range data-capable radio, there is room for one more, and this was often occupied with a "crew entertainment system." The mortar is not designed to be dismounted and the vehicle has no extra bipod, baseplate, or ground-mount sight. Though minor changes in deflection can be made without moving the turret, deflections of more than 3 degrees must be made by turning the turret. The mortar can elevate and depress from -4 to 85 degrees, however, making near shots as well as direct fire possible. The Pbv-401GRK does, in fact, normally carry a small amount of antivehicle and antiarmor rounds. There is little in the way of gun stabilization. (The mortar fires over the front of the vehicle, or more properly, in the direction the turret is facing. The driver has a night vision sight, and the gunner passive IR as well as advanced image intensification. The commander is limited to standard image intensification, though he can tap into the gunner's sights. On each side of the vehicle, on either side of the gun position, is a firing port; this is a simple firing port that is a simple hole in the armor with a shutter. These ports lever shut for a positive seal, as the Pbv-401GRK has an NBC overpressure system with common mask interfaces as a backup. The engine upgrade to 290 horsepower was done, but the small turret with a machinegun was removed. Any deck hatches other than the driver, commander, or loader's hatches were removed. The rear-mounted turret makes the Pbv-401GRK too unbalanced to allow the vehicle to swim.

Twilight 2000 Notes: In the Twilight 2000 timeline, the three prototypes were brought up to a common standard with the 10 other examples that managed to be modified from their existing MT-LB fleet. They did not survive long enough to receive any wartime improvements or appliqué armor.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$216,812	D, A	492 kg	13.93 tons	5	22	Passive IR (D, G), Advanced Image Intensification (G), Image Intensification (C)	Enclosed

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor

146/102	36/23	450	143	Std	T3	TF7 TS4 TR3 HF5 HS2 HR2
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Fire Control	Stabilization	Armament	Ammunition
+1	Basic	120mm TDA MO 120 RT, PKT, PKM (G)	50x120mm, 4000x7.62mm

KMZ BMP Automortar

Country of Origin: Russia (Soviet Union)

Notes: This vehicle does not exist in real life, though the Czechs do make a similar vehicle. This one is the product of the designers at GDW.

Twilight 2000 Notes: This is a turretless BMP-2 with an 82mm Vasilyek mounted in the chassis in place of the turret. The mortar fires over the rear of the vehicle, and is not capable of direct fire from the vehicle. Characteristics are the same except for reduced passenger capabilities. The mortar can be lowered so that the roof hatches may be closed. One firing port on each side and one in the rear are retained and may still be used.

Merc 2000 Notes: This vehicle does not exist in the Merc 2000 timeline.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$180,796	D, G, AvG, A	1.5 tons	11.25 tons	4	14	Passive IR, Image Intensification	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
102/72	20/15/2	462	94	Std	T2	HF8 HS4 HR4

Fire Control	Stabilization	Armament	Ammunition
None	None	82mm Vasilyek automortar, PKT (C)	40x82mm, 1000x7.62mm

M-18

Country of Origin: United States

Notes: This vehicle does not exist in real life; it is a product of the imaginations of the designers at GDW, though I have considerably added to the back story.

Twilight 2000 Notes: This is a limited-production version of the M-2 Bradley IFV. In this version, the turret is removed and the firing ports plated over. In the passenger space is mounted a turntable with a 120mm mortar. The vehicle carries a baseplate and bipod so that the mortar can be dismounted and fired away from the vehicle. The M-18 was produced only when production of the M-1064A3 mortar carrier version of the M-113A3 fell behind and more mortar carriers were need in a hurry. In addition, the modifications were available as a kit for use in Bradleys that had irreparably damaged turrets but still useable hulls, and some were modified in-theatre by third-echelon maintenance shops. Despite this, these vehicles were far rarer than the M-1064A3. The hull front driver's hatch is retained, as is the rear ramp; opposite the driver's hatch is a commander's hatch with a weapon mount, and on the rear deck is a large double hatch for the mortar. The M-18 was, basically, an in-theater modification, an extreme example of BDAR.

Merc 2000 Notes: This vehicle does not exist in the Merc 2000 timeline.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$128,065	D, A	1 ton	20 tons	5	16	Passive IR	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
121/84	25/20/2	662	141	Std	T4	HF8 HS4Sp HR4

Fire Control	Stabilization	Armament	Ammunition
None	None	120mm M-121 mortar, MAG (C)	88x120mm, 2200x7.62mm

Streaker/LAU-97

Country of Origin: Belgium

Notes: This Belgian vehicle is the LAU-97 multiple rocket launcher mounted on the British-made Streaker chassis. It is in service with Belgium, and Indonesia. The load area of the Streaker is largely taken up with a 40-round launching box and the associated mounting machinery, though there is still much room for the crew's supplies or extra launching boxes. Note that the entire cab is protected by the HF armor value from all angles, not just the front. This particular combination (Streaker and LAU-97) has so far been presented only as a demonstrator.

Twilight 2000 Notes: Belgium hurried 24 examples of this vehicle into production in time to use against French forces. The survivors were subsequently used by the French during their invasion of Holland, Luxembourg, and Germany.

Merc 2000 Notes: The British are using 8 of these vehicles as an experiment as of 2000. The Belgians have sold some to an unnamed Middle Eastern country, and to Mexico.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$121,469	G, AvG, A	2 tons	10.8 tons	3	7	Headlights	Shielded (Cab Only)

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
140/98	30/20	320	70	Trtd	T2	TF2 TS2 TR2 HF6 HS1 HR1

Fire Control	Stabilization	Armament	Ammunition
None	None	40-Round LAU-97 MRL	40-Round LAU-97 MRL

Denel T-6

Country of Origin: South Africa

Notes: This South African vehicle was designed for the Indian self-propelled howitzer competition. The turret is developed from the turret of the G-6, and the chassis is taken from captured and home-manufactured T-72 chassis. The turret has ammunition-loading hatches on the right and left, and a conveyor belt may be extended from either of these hatches for ammunition loading or direct feeding of the gun from a ground pile. There are two hatches on the roof of the turret. The vehicle is equipped with GPS and a fire control computer for direct laying of the gun, or firing at a target where the location is known.

Twilight 2000 Notes: When the Twilight War broke out, the remaining prototypes were taken into South African service and production was begun.

Merc 2000 Notes: After losing in the Indian SP Howitzer competition, one prototype T-6 was placed in a museum, and the rest dismantled.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$404,657	D, A	400 kg	46 tons	6	17	Passive IR	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
117/82	25/20	1000+400	274	Trtd	T6	TF14 TS7 TR7 HF100 HS14 HR8

Fire Control	Stabilization	Armament	Ammunition
+1	Basic	155mm L/52 Howitzer, M-2HB (C)	45x155mm, 550x.50

GDLS XM-2001 Crusader

Country of Origin: United States

Notes: The Crusader is a completely automated system, with the gun and ammunition being aimed, loaded, and fired by remote control. The turret is unoccupied, with the weapons being operated by the crew in the front of the hull. The gun is laid and controlled by computer. The Crusader requires no FDC and its fire control system is totally self-contained, requiring only information from forward observers or reconnaissance aircraft. Accurate fire can begin within three phases of a halt. Rate of fire is vastly improved over normal howitzers, as is armor protection and fire control for direct fire. Note that the turret is only capable of traverse 20 degrees on either side of center, but the vehicle is capable of rapid pivot steers for larger deflection changes. If the turret is penetrated in combat, no crew casualties are possible. The Crusader has become a political football in the budgetary process; the last I heard, it has been cancelled, but this has gone back and forth several times.

Twilight 2000 Notes: This vehicle does not exist, except for four evaluation vehicles that were used against the Mexicans in Texas.

Merc 2000 Notes: The Crusader made it through the budgetary process, but the first vehicles were not delivered to operational units until 2008.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$486,432	D, G, AvG, A	850 kg	40 tons	3	15	Thermal Imaging, Image Intensification	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
121/85	25/20	700	242	Trtd	T5	TF13 TS7 TR7 HF16 HS5 HR4

Fire Control	Stabilization	Armament	Ammunition
+3	Fair	155mm L/56 howitzer, M-2HB	60x155mm, 2000x.50

GDLS XM-2002 Crusader RSV

Country of Origin: United States

Notes: These vehicles are issued to units along with the Crusader SPH; they are issued as a set. The Crusader RSV (ReSupply Vehicle) was designed to carry ammunition and fuel for the Crusader SPH and resupply the howitzer in action. It does this through a docking port that hooks onto the Crusader SPH in the rear of the turret. The ammunition is conveyed automatically to the Crusader SPHs magazines, and fuel is transferred to the Crusader's fuel tanks. Ammunition is conveyed at the rate of one round per two phases. Fuel is transferred at the rate of 5 liters per phase. The Crusader RSV has a remote cupola with an M-2HB; as with the SPH,

the refueling and rearming process is completely automated and the crew sits in the front of the vehicle under the glacis plate. The Crusader has become a political football in the budgetary process; the last I heard, it has been cancelled, but this has gone back and forth several times.

Twilight 2000 Notes: This vehicle does not exist, except for four evaluation vehicles that were used against the Mexicans in Texas.

Merc 2000 Notes: The Crusader made it through the budgetary process, but the first vehicles were not delivered to operational units until 2008.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$574,076	D, G, AvG, A	1 ton	33 tons	3	13	Thermal Imaging, Image Intensification	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
121/85	25/20	1400	179	Std	T5	HF16 HS5 HR4

Fire Control	Stabilization	Armament	Ammunition
+2	Fair	M-2HB	2000x.50, 60x155mm (Rounds Only)

ASELSAN Tafun

Country of Origin: Turkey

Seen In: Current development by ASELSAN of Turkey for the Turkish Army.

Notes: Though the resulting vehicle name, if one results from this research, is not known, the current project name is Tafun, and so that is what I'm calling the vehicle here. The Turkish expect to have a working vehicle by 2024 and deployment by 2028, though research has admittedly (according to ASELSAN) been more difficult than first thought and if any artillery vehicle results from Project Tafun, it will probably be late.

The Tafun SPH centers around a turret mounting a 155mm L/39 railgun rather than conventionally-propelled ammunition. It should be noted that several countries are working on a similar system, including the US and Israel, and are having similar setbacks, mostly in the area of generating the large amounts of electricity in a self-contained vehicle without using the engine, instead using an internal high-capacity electrical generator powered by what is essentially a second engine designed to produce electricity instead of motive power. If Turkey is successful with Project Tafun (and it seems, from several accounts, to be ahead of other countries in producing a working prototype), it will be the first country to have an SPH which uses a railgun for its primary armament. The Turkish have been testing the turret and gun of the Tafun on a pedestal mount with external power generation, and despite the short length of the howitzer barrel, hits have been achieved at a range of 72.5 kilometers (though this was not a pinpoint hit, instead using an area salvo where the rounds all hit within an acceptable CEP).

The internal firing engine must produce 8 Mj of energy to fire a round to this range. So far, only HE rounds have been fired from the gun prototype, though rounds equivalent to standard NATO rounds are envisioned for the system, as well as advanced rounds guided by laser, radio, or GPS. So far, no direct-fire rounds are being developed for the Tafun, though the ammunition page will include some for GP. The Tafun Project is also undertaking a lot of stress testing, as several components of the Tafun gun have failed during firing or autoloading, and the electricity-producing engine tends to fail to deliver the necessary power, resulting in shorter than expected range, stuck rounds, and rounds which do not fire at all.

That said, the vehicle presented below is for a working vehicle that is at least a limited-production vehicle; we will assume that ASELSAN hit the Turkish Army's deadline in 2028 for a working vehicle in limited production. The caliber, as mentioned, is 155mm L/39, however, there are no propellant charges or any sort of chemical propulsion. Instead, the gun barrel and breech have a pair of stainless steel rails which connect to the electricity-producing engine. The rounds are aluminum, but surrounded by stainless steel sabots to help propel the rounds through the barrel. The actual caliber of the aluminum round is therefore smaller than the gun barrel at 127mm. The sabots are discharged in halves from the barrel when a round is fired. The sabots are not large; they are just enough to interact with the launch rails. The rounds' speed is hypersonic, and together with the fire control software are capable of intercepting aircraft within 40 kilometers, UAVs within 50 kilometers, and ground targets (depending on whether they are moving or not) at ranges from almost zero to over 2000 meters, or possibly more. Other possible targets include incoming cruise missiles, air-to-ground missiles, and even artillery or mortar shells within range, (In one low-altitude test, a Tafun round was able to intercept an air-to-air missile fired from a Turkish fighter against a decoy target.) The round development has included indirect artillery fire with target destruction achieved by the speed and force of the incoming rounds rather by an HE filler.

Fire control is provided by a specialized system allowing the gunner or commander to quickly select the type of target and magazine to load from, and to select the type of target. The Tafun also has an AESA-type target detection and acquisition radar, along with a comprehensive day/night visual suite, including up-to-date night vision gear, CCD cameras, and several telescopic sights, as well as a unity sight with a reticle on it for close-range shots.

Unfortunately, generating enough electrical power to fire a shot is not fast, and while the Tafun is capable of quick MRSI salvos and other quick area or pinpoint salvos, firing five shots in rapid succession will require the engine to spend 30 seconds developing the necessary power to fire another such salvo. Normal rate of continuous fire is one round every 6 seconds, though as stated, five

rounds may be fired in rapid succession, after which the generator is drained for 30 seconds. Quick single-shot firing may also be conducted, which will drain 1/10's of the generating engine's power.

As a Tafun is a high-priority target, armor-protection is much greater than most SPHs. Especially on the turret. The vehicle is also capable of mounting both standard and MEXAS applique armor, and also has lugs for ERA on the sides of the vehicle, glacis, lower bottom part of the front of the vehicle, and on the turret sides, rear, and front, and front quarter of the turret. The commander controls an RWS above his hatch upon which a couple of weapons are mounted, and has 360-degree rotation. It is possible that an Israeli-made Trophy APS may be mounted on the Tafun.

Engine power and the chassis are provided for by a Turkish-modified MAN 8x8 truck, with armor added and puncture-resistant run-flat tires. The engine power is distributed 8x8, with a fully-automatic transmission with a manual backup. The engine is under the cab; the complete power pack may be removed by hinging open the cab. The rear-mounted electrical engine is removed by sliding out the rear. The motive power is provided for by its own fuel tanks, and the electrical firing engine has its own fuel tanks. In addition, the Tafun is equipped with a 30kW APU which runs off the vehicle's fuel, and can provide power for up to 30 shots or power up three other guns for up to 15 shots, or an FDC, plus two conveyor belts for ammunition resupply. Ammunition resupply is normally done through doors on either side of the Tafun's turret, but the loader's hatch may also be used. The turret carries the Gunner and Loader, while the cab carries the Driver and Commander (though the RWS is on top of the turret). The gunner and loader may also be stationed in the cab, with remote equipment like the Driver and Commander have.

Note that the generator engine cannot be tapped to provide power to the rest of the vehicle; however, the fuel supply for the generator engine can be so tapped.

Vehicle	Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
Tafun	\$2,365,981	D, A	625 kg	56.17 tons	4	43	Image Intensification (D), Backup Camera (D), Day/Night CCD Camera (D, G, RWS, C), 2 nd Gen Image Intensification (G, RWS, C). 3 rd Gen FLIR (G, RWS), AESA Radar (100km, G, C)	Shielded
Tafun w/Aplique	\$2,367,061	D, A	482 kg	58.46 tons	4	45	Image Intensification (D), Backup Camera (D), Day/Night CCD Camera (D, G, RWS, C), 2 nd Gen Image Intensification (G, RWS, C). 3 rd Gen FLIR (G, RWS), AESA Radar (100km, G, C)	Shielded
Tafun w/MEXAS Applique	\$2,189,532	D, A	553 kg	57.32 tons	4	45	Image Intensification (D), Backup Camera (D), Day/Night CCD Camera (D, G, RWS, C), 2 nd Gen Image Intensification (G, RWS, C). 3 rd Gen FLIR	Shielded

Tafun w/Trophy System	\$2,489,471	D, A	612 kg	56.38 tons	4	46	(G, RWS), AESA Radar (100km, G, C) Image Intensification (D), Backup Camera (D), Day/Night CCD Camera (D, G, RWS, C), 2 nd Gen Image Intensification (G, RWS, C). 3 rd Gen FLIR (G, RWS), AESA Radar (100km, G, C)	Shielded
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Vehicle	Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
Tafun	161/82	44/22	500 +200	248 + 8/Shot	Trtd	W(6)	TF32Cp TS24Cp TS15 HF40Cp HS40Cp HR15*
Tafun w/Applique	158/80	43/22	500 +200	253 + 8/Shot	Trtd	W(6)	TF36Cp TS28Cp TS15 HF44Cp HS44Cp HR15**
Tafun w/MEXAS Applique	160/81	43/22	500 +200	251 + 8/Shot	Trtd	W(6)	TF37Cp TS29Cp TS16Sp HF48Cp HS48Cp HR15***
Tafun w/Trophy System	160/82	44/22	500 +200	249 + 8/Shot	Trtd	W(6)	TF32Cp TS24Cp TS15 HF40Cp HS40Cp HR15*

Vehicle	Fire Control	Stabilization	Armament	Ammunition
Tafun	+4	Fair	155mm L/39 ETC Howitzer, M2HB (RWS), Mk 19 (RWS)	60x155mm ETC rounds, 2000x.50, 2000,40mm Grenade

*Cab Roof AV is 6, Turret Roof Armor is 6Sp. Floor Armor is 10Sp.

**Cab Roof AV is 6. Turret Roof AV is 7Sp. Floor Armor is 12Sp.

*** Cab Roof AV and Turret Roof AV is 7Sp. Floor Armor is 12Sp. The vehicle has an MRAP hull.

Soltam Rascal

Country of Origin: Israel

Notes: The class that of SP artillery that the Rascal is in is a rather rare category; the Rascal is designed to be able to use most conventional road surfaces and bridges (including railroads) without damage to the road or railroad surfaces. For the same reason, over most roads, tank transporters are not needed, simplifying logistics. The Rascal has not been exported, despite heavy marketing by Soltam, and its appearance as several arms shows throughout the world, and despite the fact that the Rascal was aimed at the export market. Unlike many SP artillery vehicles, the Rascal is not based on any tank, SP gun, or APC chassis; it is a custom-built vehicle. The Rascal is the lightest SP artillery system developed by Soltam (now a part of IWI), who envisions an array of vehicles based on the Rascal chassis. With an L/39 barrel, it is known as the Rascal, while the L/45 and L/52 versions are called the Diabillo.

The Rascal was designed to be light in weight, able to take those roads mentioned above as well as smaller road and railroad bridges. The key is that the Rascal is relatively light in weight, and the vehicle is rather long in size and has a tracked suspension, able to spread its weight in a large area. The compact design also allows it to be air-transportable, not including the C-130/G.222 series of aircraft (though with its L/39 gun, it *can* fit in those aircraft). The light weight also makes quick and mobile in combat situations or road marches. It is capable of negotiating most terrain types.

The gun is a Soltam-designed 155mm howitzer, and an L/39, L/45 or L/52 gun may be used. The gun is mounted at the rear of the vehicle, and extends through most of the fighting compartment, with the gun in either iteration hanging over the front of cab when in travel configuration. The gun is mounted on a turntable, allowing a traverse of 30 degrees in either direction, and with elevation of +65 degrees, and depression of 0 degrees. Before firing, a pair of hydraulic jacks is lowered at the rear corners of the vehicle for stabilization. The Rascal has 36 ready rounds of ammunition, with another four kept in its shipping crate. These are stored in the front of the fighting compartment. The gun is fed by an autoloader; all the crew must do is insert the correct order of shells. There are no

mounts for heavier weapons on the Rascal; however, a cluster of five smoke grenades is found on each front bumper.

Armor, unfortunately, nothing to write home about, which also keeps the vehicle lightweight. The rear of the fighting compartment has no armor whatsoever, and is exposed to the outside elements. The fighting compartment is also open to the elements, though on each side are low-rising armored plates with internal equipment storage. (The prototype Rascals were equipped with a set of steel tubes for a framework and hard Kevlar AV2 panels, but in testing, the crews considered them an impediment and that it took too long to deploy.) The ammunition racks are also inside an armored box, made of steel lined with thick Kevlar sheets. The charges are stored in a similar compartment forward of the gun. For that matter, the vehicle chassis is of largely steel construction, with some elements, such as roadwheels, hatches, and other such features made of aluminum alloy. When in travel configuration, the crew rides inside the better-armored crew cab, which has NBC overpressure protection, an air conditioner, and a heater. Most of the crew rides just forward of center right of the vehicle, with overhead hatches and shuttered vision blocks to the front. The driver's position is set forward near the front left of the vehicle in an armored sponson; he has large windows in the front and on either side, with armored shutters to lower if needed. In front of the crewmembers (except for the driver's position) there is space for the crew's personal gear, rations, water, and such. Normally, only the driver's position has night vision, though optionally, one or more of the other crewmembers' positions may have such equipment installed.

Power is provided by a turbocharged diesel developing 350 horsepower. The engine is near the center of the vehicle in the left, behind the driver. The Rascal also has an automatic transmission, along with conventional driving controls that are power-assisted. Despite the seemingly-low power of the engine, the Rascal is very quick and maneuverable due to its low weight. In the front hull there is a recovery winch with a capacity of 30 tons and 60 meters of cable.

The Rascal has GPS, but no capability to come up with its own targeting information (lacking the necessary fire control computers to hold down costs) and an FDC is required for anything but inaccurate fire. The Rascal does have a mapping computer and an artillery ballistic computer which can take the information directly from the FDC and convert it into fire coordinates.

Twilight 2000 Notes: Due to accelerated testing and production, some 20 Rascals were available to the IDF for the Twilight War. These were used primarily by the IDF, though one captured example each was used by Lebanon and Syria.

Vehicle	Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological**
L/39 Gun	\$683,413	D, A	750 kg	19.5 tons	4	16	Passive IR (D)	Shielded
L/45 Gun	\$698,972	D, A	734 kg	19.76 tons	4	17	Passive IR (D)	Shielded
L/52 Gun	\$717,739	D, A	693 kg	20.06 tons	4	19	Passive IR (D)	Shielded

Vehicle	Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor*
L/39 Gun	130/92	36/25	500	130	Std	T4	HF4 HS2 HR2
L/45 Gun	129/91	36/25	500	132	Std	T4	HF4 HS2 HR2
L/52 Gun	128/90	36/25	500	134	Std	T4	HF4 HS2 HR2

Vehicle	Fire Control	Stabilization	Armament	Ammunition
L/39 Gun	+1	Basic	155mm L/39 Howitzer	40x155mm
L/45 Gun	+1	Basic	155mm L/45 Howitzer	40x155mm
L/52 Gun	+1	Basic	155mm L/52 Howitzer	40x155mm

*Hull armor on the Rascal is a bit complicated. The armor figures listed above are largely for the vehicle's cab. The fighting compartment is open, and therefore offers little protection; however, the rear half of the vehicle, where the ammunition is stored, is contained within AV2 lockers that can also protect the crew if they crouch behind it or offer some protection when returning fire with their small arms. The entire cab of the Rascal has AV4, as does the floor of the entire vehicle. If the framework and the Kevlar panels are erected, they give the gun crew AV2 to the vehicle's sides and rear, except for their heads (if they are standing up).

**The Radiological protection listed above is for the cab only. The Radiological rating in the fighting compartment is "Open."

Soltam Sholef (Slammer)

Country of Origin: Israel

Notes: The Sholef (translates to "Slammer", which is slang in Hebrew for "Gunslinger") is a heavily armored artillery gun mounted on a modified Merkava Mk1 chassis. Many of these vehicles are Merkava Mk1s that were retired after the Mk 2s and Mk 3s came into service. The Sholef turret has roots going back to the late 1970s, though the turret was not mated to a Merkava chassis until 1986. The original turret was a heavily-modified M109A5 turret, but this was later replaced with a purpose-built turret only very loosely-based on the M109 series. The Sholef is a fully-modern artillery gun on par with the Paladin, PzH-2000, and Braveheart. Soltam does not appear to be offering the Sholef for export, but is offering some of the components as upgrades to existing systems; the Sholef's components have a high degree of modularity. (Though the Indian Army tested the Sholef during its search for a new artillery gun, it

was not selected.) The IDF has also declined to accept the Sholef, feeling it is too large, too heavy, and too unwieldy, though the prototypes and limited-production vehicles built are being used as testbeds for new and updated concepts in field artillery and fighting vehicles – and it has been pointed out that the Sholefs could be easily put into service in an emergency. (Different sources say that anywhere from two to eight Sholefs were actually built.) In the end, the IDF decided to go with the Doher (see above), and to a much more limited extent, the Spark, pending the full deployment of the SPW2052; such lighter – and more mobile – artillery appears to be the wave of the future on the world market.

The chassis is, of course, a modified form of the Merkava Mk 1; the primary difference is the removal of the heavy Chobham armor of the Merkava. The engine is the same turbocharged 900 horsepower diesel engine, with a T-bar steering column and automatic transmission. Armor protection, though reduced from the Merkava, is still something to cause envy to rise among artillery crews. (The Sholef was designed in part to allow it to survive a short slugfest with other armored vehicles.) The driver remains in the front center of the tank, with the powerpack in front of him; this is why the turret and driver's compartment are further back on the gun than most such vehicles. The engine and transmission are combined in a unitary powerpack that can be removed in 30 minutes and replaced in an hour by an M-88 or other appropriate vehicle and a competent mechanic team. The turret is large and blocky, good for housing a big gun but not for protection.

The main gun is a Soltam-designed L/52 155mm gun, with a large multibaffle muzzle brake, fume extractor, and heavy-duty recoil cylinders. This Soltam-designed gun, however, has a marked resemblance to the South-African-designed G5 155mm howitzer. As the Sholef is designed to survive a short engagement with armor, the gun has good stabilization and fire control equipment and even fire accurately at direct fire targets while moving at half speed (though fire is one level more difficult). The Sholef is heavy enough that external hydraulic jacks are not necessary. The turret is also designed by Soltam; is a large turret over 2 ½ times the size of the Merkava's turret. The large turret, along with proper arrangement of internal ammunition in the hull, allows for a copious onboard ammunition supply. The ammunition is arranged in ten 6-round magazines, with a further 15 rounds in bins not connected to the autoloader and generally occupied by special ammunition types or other rounds which do not fit in the autoloader or have special charge requirements. The hull door in the rear that is present on the Merkava remains on the Sholef and is used for ammo resupply; due to the internal arrangement of ammunition in magazines, rounds cannot be swapped for passengers, though two passengers or extra crewmembers can be squeezed in. A half-sized bustle is mounted to the left of the door. The Sholef's gun is fed by an autoloader that requires only two men to operate. Even the fuzes are attached automatically with this autoloader. Charge loading is manual, but comes from a tray beside the main gun. The Sholef can fire at a burst rate of 3 rounds in 15 seconds (1/phase) every 10 minutes, but normal ROF is 9 rounds per minute (ROF ½). At the rear of the turret is a large door for reloading ammunition; an integral loading belt can be lowered to load from various different vehicles of a ground pile. In front of the vehicle, on the glacis, is an electrically-operated travel lock.

The Sholef is highly computerized, and also has GPS with inertial backup and the equivalent of the US Blue Force/Red Force tracker; a computer finds the maps, digests the numbers, positions, and coordinates, and provides an indirect fire control solution. This means that the Sholef can not only fire immediately upon a halt, it does not require an FDC, and most Sholef units do not operate with one. Fire missions are received through a battery of data-capable secure radios, including two long-range, one medium-range, and one short-range radio. The computerized system also gives the commander information on the state of the Sholef, from engine conditions to fuel state to the type of round loaded into the breach. The gunner fires indirect fire missions with the aid of the computers via an LCD touch panel instead of the gunner having to use an IF sight. The same system can provide the gunner with direct fire information, though he must still use the optical sight for direct fire engagements. The driver's LCD screen provides navigation through the GPS and mapping systems and partial Blue/Red Force Tracker information, as well as state information for the powerpack and fuel. An initial barrage can be conducted automatically at the push of a few buttons by the gunner and the entry of fire support mission information – as this point, the Sholef may conduct an initial bombardment of up to six rounds without further intervention from the gunner or loader. MRSI missions can also be conducted, also automatically.

The gunner, commander, and the loader are in the turret. The commander has a manually-rotating cupola with all-around vision blocks; one has a night vision channel. The turret loader mans a medium machinegun when he is not busy in the turret, but he has no cupola and only one wide-angle vision block forward. (Initially, the prototypes did not include this secondary MG, and the MAG was put in the loader's position. The crew is protected by an NBC Overpressure system with a collective NBC backup; air conditioning and heating is also provided, along with a water/ration heater capable warming up to four MRE-type packets at once. The Sholef has a 15kW APU, which is on the front left of the vehicle, under armor; at this position on the vehicle is a small rectangular set of louvers – intake and exhaust for the APU.

M4 Scorcher

The computer wargame ARMA 3 posits a conflict between NATO and Russia/Warsaw Pact. One of the vehicles that players may unlock is the M4 Scorcher, which is an upgraded version of the Sholef. Primary differences are mostly to the armor suite – though the armor is still not as strong as a Merkava's armor, the Scorcher does use Chobham armor, including in the front of the turret. The turret itself is redesigned, being sharply-raked at the front and moderately angled on the sides. Fire control is also improved, with a laser rangefinder and upgraded direct-fire computer for direct-fire shots and the ability to conduct a quick initial bombardment of six rounds within five seconds of a halt if fire coordinate information is received and fire solutions generated while the vehicle is moving to its firing position, or within 15 seconds of a halt if the coordinate information is still being transmitted and no fire solution have been arrived at yet. Like the Sholef, the Scorcher may conduct fire missions while moving at half speed though at a cost to accuracy.

The commander has an OHWS designed specifically for the Scorcher that is armed with an M2 QCB version of the M2HB and a

Mk 19 Grenade Machinegun. These weapons may be aimed, fired, and loaded from inside the vehicle, and are fired using the commander's LCD. The OHWS has the same Stabilization and Fire Control as the Scorcher's direct fire suite. The OHWS itself does not have a hatch for the commander; instead, the commander's position is on the turret ahead of the OHWS. The Scorcher has a full BMS.

The main gun is a version of the Soltam gun licensed by Rheinmetall; the Merkava base chassis is also licensed by Rheinmetall. These were further sub-licensed to General Dynamics in Canada.

The overall vehicle is somewhat lighter than a Sholef, despite the replacement of the engine with one developing 1000 horsepower. The direct fire and armor suites are a reflection of the fact that the Scorcher is expected to survive a short engagement with armored forces and even be an ad hoc tank destroyer. The new shape and thicker armor had a cost – the Scorcher has less room for magazines and carries only eight.

Most other particulars are as on the Sholef.

The M4 Scorcher also appears in some mods of GTA 5, for reasons I don't understand but somehow make me nervous.

Twilight 2000 Notes: These vehicles were just entering production at the outset of the Twilight War and are rather rare. The M4 Scorcher is available in very small numbers in the Norwegian, Dutch, Spanish, and Turkish Armies. Some small numbers were also used by Canadian Forces; one out of every 20 produced in Canada was taken into Canadian service. These Canadian Scorchers were retained within Canada, and not sent overseas.

Vehicle	Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
Sholef	\$1,659,499	D, A	800 kg	45 tons	4	32	Thermal Imaging (G, C), Image Intensification (D, C, G)	Shielded
M4 Scorcher	\$1,730,934	D, A	863 kg	41.3 tons	4	25	Thermal Imaging (G, C), Image Intensification (D, C, G), Backup LLTV (D)	Shielded

Vehicle	Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
Sholef	142/99	39/28	1250	333	Trtd	T6	TF35Sp TS19Sp TR17 HF44Sp HS16Sp HR12*
M4 Scorcher	166/116	46/32	1250	370	Trtd	T6	TF40Cp TS24Sp TR18 HF49Cp HS19Sp HR14**

Vehicle	Fire Control	Stabilization	Armament	Ammunition
Sholef	+2	Good	155mm Soltam L/52 Howitzer, M-2HB (C), MAG (L)	75x155mm, 1000x.50, 2000x7.62mm
M4 Scorcher	+3	Good	155mm Rheinmetall/Soltam L/52 Howitzer, M-2 QCB (C), Mk19 (C), MAG or MG3 (L)	63x155mm, 1000x.50, 300x40mm, 2000x7.62mm

*Floor AV is 8Sp; Roof AV is also 8Sp

BAE Sabre

Country of Origin: Great Britain

Notes: This vehicle does not exist in real life; I don't know if it was a concept vehicle or a product of the imaginations of the designers at GDW, however.

Twilight 2000 Notes: This British heavy antiaircraft vehicle is the hull of a Chieftain main battle tank topped with a modified and more heavily armored version of the turret from a French AMX13 DCA antiaircraft vehicle. In this role, the turret is well protected and has large external ammunition bins for the greater ammunition supply carried. The Sabre proved to be a very difficult target for enemy aircraft, being well protected, supplied with large amounts of ammunition, and having an excellent fire control system. Perhaps its only failing was the slow speed of its Chieftain chassis. Unfortunately, only about 40 of them made it to war with the British Army. The driver's position is retained, and to the right and rear of the driver's position is the commander's position. On the turret roof is the gunner's hatch.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$167,713	D, A	500 kg	50 tons	3	32	Radar, Passive IR, Image Intensification	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
102/72	26/18	950	265	Trtd	T6	TF34 TS11 HR7 HF84Sp HS18Sp HR10

Fire Control	Stabilization	Armament	Ammunition
+3	Fair	2x30mm 30mm Giat 30 M 781	2400x30mm

BAE Warrior ADATS Vehicle

Country of Origin: Great Britain

Notes: This is the chassis of the British Warrior ICV fitted with the same turret as the US M924 ADATS vehicle. It has not been fielded, and probably will never be fielded in the form presented here.

Twilight 2000 Notes: This vehicle was a latecomer to the Twilight War, being initially fielded in late 1997. Few of these vehicles, perhaps less than 40, were actually built, and most were retained for use in the British Isles, with perhaps a quarter making it to the European mainland. All hatches except for the rear deck hatch are retained.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$322,774	D, A	200 kg	25.5 tons	4	22	FLIR, Passive IR, Radar	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
126/88	32/22	770	190	Trtd	T4	TF8 TS4 TR4 HF10 HS3 HR3

Fire Control	Stabilization	Armament	Ammunition
+3	Basic	8xADATS launchers	16xADATS missiles

Bernardini XM3D1 Antiaircraft Vehicle

Country of Origin: Brazil

Notes: This Brazilian vehicle is an X1 light tank with the turret replaced with one mounting an M55 Quad .50 antiaircraft machinegun. This vehicle was designed for antiaircraft use, but more often found use as an antipersonnel/light vehicle weapon. The XM3D1 was never actually put in for serial production and only a single prototype was produced. This prototype eventually faced an ignoble end as a range target for Brazilian trials Centauro B1s.

The frontal armor, in addition to applique, was given increased slope. The sides of the hull were given a moderate slope. The original engine was replaced with a Scania-Vabis DS-11 A05 CC1 diesel, with 256 horsepower. The hulls were extended slightly in the engine compartment to seat the new engines. The driver has a hatch on the front left side, and the two loaders generally stand on the hull deck during combat. (I have not been able to find out where the loaders sit during travel.) The gunner is in the center of the gun cluster, in an open topped seat. The M55 turret is very large and gives the XM3D1 a very high silhouette, and armor for the turret is very thin.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$68,913	D, A	334 kg	14.2 tons	4	10	Headlights	Enclosed

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
131/92	36/25	320	103	Trtd	T3	TF2 TS2 TR1 HF13 HS7 HR5

Fire Control	Stabilization	Armament	Ammunition

+1

Basic

M55 Quad M2HB

2500x.50

BMY XM975 Roland 2

Notes: In 1974, the US Army was looking for a replacement for the M48 Chaparral and M163 VADS combination, and in an unusual move, looked to Europe for the solution. The XM975 is the same turret and fire control system as fitted to the German Marder-based Roland surface to air missile system, but fitted for US use to the chassis of an M109 self-propelled howitzer. It was also known as the American Roland and the US Roland. The system went through extensive testing with positive results, but the Pentagon generals kept loading new requirements on the system, first upgrades to capabilities, then constant requests to lower costs. (This is why the 27 XM975 turret units that were eventually fielded were mounted on 5-ton trucks, not a survivable platform in wartime.) However, investigation of the procurement process eventually revealed a major bias against acquiring a foreign-designed system, even though all the components would be license built in the US. (NIH: Not Invented Here, a common bias in the Pentagon.)

The XM975 was originally to be mounted on a heavily modified M109A3 SP artillery vehicle, with the turret completely deleted and the hull with a superstructure built onto it, covering the rear two-thirds of the hull. Internally, the vehicle is given over to the reloading machinery for the Roland 2 turret and the missile system's electronics and radar. Little is retained from the M109A3 except the driver's position, the powerpack, and the suspension. The American contribution to the XM975 was the radar, which had similar performance to the radar on the German Roland/Marder system, though the two radar units are not interchangeable without a software fix for the fire control computer and radar control system. The missile system automatically reloads the missile rails when the launchers are empty from a magazine and reloader at the rear of the vehicle; this system may also be used manually if only one launcher is expended. The Roland 2 missile was given the designation XMIM-115A for testing purposes, but is functionally the same as the Roland 2 missile. Though not type standardized by the US, the XM975 is also capable of firing Roland 1 missiles.

A 10kW APU was added for power when the engine is switched off. Power is produced by a derated 8V71T developing 406 horsepower, which makes the XM975 slightly underpowered. The driver is on the front left, the rest of the crewmembers are in the turret.

After a lot of stalling and hassle, the 27 XM975 turrets and 600 missiles were assigned to a National Guard ADA battery, where they languished until 1988, when they were deactivated, and went to a boneyard. The XM975 itself was never put into production, and only one functioning prototype was produced.

Twilight 2000 Notes: These systems began production in the late 1980s and were fairly common during the Twilight War, though they were used only by the US Army and Air Force.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$589,322	D, A	558 kg	25.95 tons	4	20	Radar (16.5 km), Image Intensification (G, C), Thermal Imaging (G, C), Passive IR (D)	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
118/82	33/23	511	150	Trtd	T4	TF2 TS2 TR2 HF10 HS3 HR3

Fire Control	Stabilization	Armament	Ammunition
+2	Basic	2xXMIM-115A (Roland 2) Launchers	12xXMIM-115A (Roland 2) SAMs

Boeing M21 Laser ADA

Country of Origin: United States

Notes: This vehicle does not exist in real life; it was invented by the designers of *Twilight 2000* at GDW, along with its companion vehicle, the M22 LGV, below.

Twilight 2000 Notes: This is the actual weapon-carrying component of the M21/22 antiaircraft system. Like the M22, it is based on a LAV-75 chassis; instead of a standard turret, the vehicle has one with a long, cherry picker lift mounting the 300Mw laser. The M21 has a capacitor that can store the energy needed for three shots; to make further shots, the M21 must be hooked up to the M22 LGV.

The laser in the M21 follows special fire rules. A die roll is made to hit; the laser hits on any number except for a 20 if a lock is made first. Making a lock on requires one phase and is an Easy: Electronics or Average: Heavy Gun task. Without this lock-on, hitting with the laser is an Average: Electronics or Difficult: Heavy Gun task at short range. The accuracy of the laser is degraded by two places in light fog, rain, or snow, and three places in heavy fog, rain, or snow; with the lock on, accuracy under these circumstances allows the laser to hit on every die roll except a 18-20 in light precipitation or 13-20 in heavy precipitation. There are three hatches on the front deck of the vehicle; these are for (from right to left) the commander, gunner, and driver. The commander's hatch has a weapon mount.

This was a rather rare vehicle in the Twilight War; despite it having been okayed for production status in 1996, production was done at a very low rate, and perhaps only 40 sets (M21 and M22) were made. 10 of these were retained for use in the continental US, 15 to the Middle East, 10 to Europe, and 5 to Korea. It is possible that another example was produced before all these, and tested in Israel just prior to Twilight War; the disposition or even existence of these vehicles was never proven.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$415,620	D, G, AvG, A	500 kg	16 tons	3	24	Image Intensification, FLIR, Radar	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor

142/100	33/23	520	78	CiH	T2	TF4 TS4 TR4 HF12 HS4 HR4
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Fire Control	Stabilization	Armament	Ammunition
+5/Special	Fair/Special	300Mw Laser, MAG (C)	Special, 2000x7.62mm

Boeing M22 Laser Generation Vehicle

Country of Origin: United States

Notes: This vehicle does not exist in real life; it is a product of the designers at GDW.

Twilight 2000 Notes: The M21 LADA was the only operational production laser vehicle produced during the Twilight War. The laser in this vehicle requires a great deal of power for sustained use; the M22 Laser Generation Vehicle (LGV) was used to generate the power for the M21's laser. Like the M21, only about 40 were produced; 10 of them were retained along with M21s for homeland defense in the US, and about half of the rest were deployed to the Middle East, with 10 being sent to Europe and 5 to Korea. It is also rumored that the system was combat tested in Israel just prior to the Twilight War, though the existence or disposition of this system is not known to this day. The M22 uses a modified LAV-75 hull; in this hull is installed a large generator instead of the turret and ammunition. The vehicle commander has a hatch on the front right deck with a weapon mount, with the generator operator in the center and the driver to the left.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$49,660	D, G, AvG, A	500 kg	17 tons	3	12	Passive IR	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
142/100	33/23	520	78	Std	T2	HF12 HS4 HR4

Fire Control	Stabilization	Armament	Ammunition
None	None	MAG (C)	2000x7.62mm

Boeing XM12 Laser ADA

Country of Origin: United States

Notes: This vehicle does not exist in real life; it was made up by the designers at GDW, though I have added some back-story.

Twilight 2000 Notes: As denoted by its designation, the XM12 was an experimental system produced on a limited basis for the US Army starting in late 1994. Low-rate production ensued for test vehicles, but the dozen prototypes were taken to war in 1996 and acquitted themselves well, even intercepting tactical ballistic missile warheads with good results. The vehicle consists of an early M1 main battle tank hull topped with a turret mounting a 300 Mw laser on a cherry picker lift. Coupled with the vehicle's advanced fire control system, the result was a very accurate air defense system able to intercept even supersonic aircraft operating at treetop level. The M1 hull is large enough to house the generator and capacitor in the same hull, without the need for a generator vehicle. A small number of additional XM12s were built between 1996 and 1998; at least two were sent to Korea, another 6 to Europe, 4 to the Middle East, and two were retained at the Air Defense Artillery School at Fort Bliss in Texas for further testing and development.

The laser in the XM12 follows special fire rules. A die roll is made to hit; the laser hits on any number except for a 20 if a lock is made first. Making a lock on requires one phase and is an Easy: Electronics or Average: Heavy Gun task. Without this lock-on, hitting with the laser is an Average: Electronics or Difficult: Heavy Gun task at short range. The accuracy of the laser is degraded by two places in light fog, rain, or snow, and three places in heavy fog, rain, or snow; with the lock on, accuracy under these circumstances allows the laser to hit on every die roll except a 18-20 in light precipitation or 13-20 in heavy precipitation. It was discovered that the gunner of the XM12 could allow the charge to build up in the laser unit for 5 seconds, allowing for a single massive discharge capable of destroying or damaging light vehicles as well as aircraft, causing more damage. Firing the laser in this way causes minor damage to the laser on a roll of 1 on 1D10; if the laser is fired when damaged by this effect, it is destroyed.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$776,600	D, G, AvG, A	700 kg	44 tons	3	36	FLIR, Radar, Passive IR	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
204/130	48/33	1900	566	CiH	T6	TF6 TS6 TR6 HF150Cp HS24Sp HS16

Fire Control	Stabilization	Armament	Ammunition
+5/Special	Fair/Special	300Mw Laser, M2HB (C)	Special, 600x.50

GDLS FAAD-M1 Liberty

Country or Origin: United States

Seen In: Part of the (still) continuing attempts to produce a successful FAADS vehicle. (From time to time, this vehicle is still experimented with, with new systems and improvements.)

Notes: The Liberty Program was first designed in 1987 to replace the defunct Sergeant York AAA gun, as well as provide a vehicle with more capability, including missile armament for longer-range interceptions, as well as a defense against helicopters, slow and fast-moving aircraft, and cruise missiles. There were several iterations of the Liberty System, as the System evolved through time. The Army eventually wanted 562 Libertys, with 166 of those being Liberty 1s and the remainder being Liberty 2s. Eventually, the GAO conducted a study which found that the Liberty, in all iterations, was too expensive compared to similar AAA systems, and the Congress decided to kill it in the late 1990s, without having seen even field testing, only a few controlled tests.

Most of the Liberty Series used the hulls of retired M1 tanks, along with a special turret housing autocannons and missiles in side sponsons, along with advanced ranging and detection equipment, including advanced FLIR, laser rangefinder, and surveillance radar and tracking radar. It also had long-range LLTV and integrated IFF. The Liberty had robust fire control computers that provided tracking, detection, and identification of threat aircraft, with a computer for both the guns and missiles. The guns were for close-in defense, with the missiles providing medium-range air defense. They could not be fired at the same time, nor could the guns be fired at the same or nearby targets with a missile in the air, as a danger existed that shells from the autocannons would hit the missile(s). The guns could be depressed enough to fire at ground targets, with the targeting computer and laser rangefinder operating for ground fire.

The initial Liberty prototype, also known as the Liberty White Sands Prototype, was used primarily for firing and detection tests, and was mounted on a French AMX-30 MBT chassis and had a turret mounting two M3M .50-caliber machineguns and six Shahine missiles, three in each sponson. This was primarily used in the initial White Sands feasibility study and was never meant to be a production vehicle, used only for firing, detection, and threat identification tests. Liberty 1 used the same systems, on an M1A1 MBT hull; it was originally envisioned as a production vehicle, but the development of improved sensors and missiles led the Liberty 1, if the Liberty System was OK'd, to be an LRIP version until the Liberty 2 was available. Later, the hulls of the Liberty 1 and some of the sensor and computer suite were used in the Liberty 2, and the Liberty 1 became a developmental vehicle for the Liberty 2.

The Liberty 2 featured the new Liberty SAMs (based on the Crotales) in six-round sponsons on either side of the turret. The guns were upgraded to 25mm Bushmaster Chain Guns. The turret otherwise primarily housed the sensor suite, which included the TSR 2630 radar, which combined the functions of tracking, detection, identification, and IFF interrogation. Tracking had a range of 30 kilometers and could track 24 targets; detection had a range of 40 kilometers and automatically interrogated the aircraft via IFF; identification had a range of 20 kilometers. The FLIR was upgraded, and improved image intensification was added along with longer-range LLTV for positive aircraft identification. None of the crew was housed inside of the turret; instead, all crewmembers were housed inside the hull, with the driver, gunner, and sensor operator being in the front hull, along with the fire control computers and downlinks to the weapons and sensors.

Vehicle	Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
Liberty	\$1,227,389	D, G, AvG, A	400 kg	30 tons	3	40	Surveillance Radar (30 km) (G, S), Tracking Radar (20 km) (G, S), IFF (30 km) (G, S), 2 nd Gen FLIR (G, S)	Shielded
Liberty 1	\$1,830,372	JP8, D, A	700 kg	26.76 tons	3	37	Surveillance Radar (30 km) (G, S), Tracking Radar (20 km) (G, S), IFF (30 km) (G, S), 2 nd Gen FLIR (G, S), 2 nd Gen LLTV (G, S), Image Intensification (D)	Shielded
Liberty 2	\$2,946,701	JP8, D, A	700 kg	27.2 tons	3	39	TSR 2630 Tracking/Detection/Identification/IFF Radar (G, S), 3 rd Gen FLIR (G, S), 3 rd Gen Image Intensification (G, S), 3 rd Gen LLTV (G, S), Thermal Imaging (D), Backup LLTV Camera (D)	Shielded

Vehicle	Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
Liberty	165/116	46/32	970	268	Trtd	T6	TF27Sp TS21Sp TR10 HF58 HS12 HR8
Liberty 1	202/141	41/29	1911	963	Trtd	T6	TF27Sp TS21Sp TR10 HF67Cp HS26Sp HR10
Liberty 2	200/140	41/29	1911	971	Trtd	T6	TF27Sp TS21Sp TR10 HF67Cp HS26Sp HR10

Vehicle	Fire Control	Stabilization	Armament	Ammunition
Liberty	+2	Basic	2xM3M Machineguns, 6xShahine SAM Launchers	5000x.50, 6xShahine Missiles
Liberty 1	+2	Basic	2xM3M Machineguns, 6xShahine SAM	5000x.50, 6xShahine Missiles

Liberty 2	+3	Fair	Launchers 2x25mm M242 Autocannons, 12xCrotale or VT-1 Liberty SAM Launchers	3000x25mm, 12xCrotale or Liberty Missiles
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GDLS LAV-PIVAD

Country of Origin: Canada

Notes: Though this would seem to be a natural modification of the LAV-25, this vehicle does not seem to actually exist; it may have been studied by the US Marines, but I think it was probably an invention of the designers at GDW. There is a LAV-based antiaircraft vehicle, the LAV-AD, but this is *not* it.

Twilight 2000 Notes: This rare modification of the LAV-25 was an interim antiaircraft vehicle development first used until the LAV-AD was ready. Though designed as an antiaircraft vehicle, the Marines in the Middle East equipped with them soon realized its utility against personnel and light vehicles, and that is how the Marines primarily used them after the LAV-AD arrived on the scene, since the LAV-AD was superior against light vehicles. This utility was helped by the fact that, unlike the LAV-AD, the LAV-PIVAD retains its firing ports. Later in the war, US Army light infantry divisions were equipped with them in small numbers, and the Saudi Arabian Army and Qatari National Guard also received a few. The turret of this vehicle is the same as mounted on the M163 PIVAD vehicle.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$151,982	D, A	400 kg	12.5 tons	3	10	Passive IR, Radar	Enclosed

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
142/56	36/14/4	300	80	Trtd	W(6)	TF6 TS3 TR2 HF6 HS4 HR4

Fire Control	Stabilization	Armament	Ammunition
+1	Fair	20mm M61 Vulcan, MAG (C)	1800x20mm, 750x7.62mm

GDLS M691 Diana

Country of Origin: United States

Notes: This vehicle does not exist in real life; a similar system was studied in the mid-1980s by the US Army, but this particular version of that idea seems to be the product of GDW. I have embellished the story considerably, however.

Twilight 2000 Notes: This vehicle was developed on the fly in response to a US Army requirement for a heavily armored, highly survivable self-propelled antiaircraft gun. The system uses a small turret mounting twin Bushmaster autocannons on top of the hulls of retired M1 Abrams main battle tanks, coupled with a newly-developed LIDAR (Laser Imaging raDAR) system that gives the Diana excellent accuracy. Despite the popularity of the Diana, the system was in somewhat short supply, as it was felt that the older M1 tanks were needed more to return to service as main battle tanks than to be used to produce new weapon systems.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$377,989	D, G, AvG, A	700 kg	44 tons	3	30	FLIR, Passive IR	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
204/143	48/33	1907	566	Trtd	T6	TF30 TS7 TS6 HF150Cp HS24Sp HS16

Fire Control	Stabilization	Armament	Ammunition
+5	Good	2x25mm M242 Bushmaster Autocannons	500x25mm

GDLS M757 Blazer

Country of Origin: United States

Notes: Studied intensely for many years, this vehicle was never actually placed into production, though many prototypes were built. (The nomenclature "M757" is something I made up myself.)

Twilight 2000 Notes: The Blazer is the basic M2 Bradley chassis fitted out for an antiaircraft role with a triple-barreled 30mm Chaingun system and two quadruple Stinger launchers.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$361,940	D, A	200 kg	29.5 tons	4	26	Thermal Imaging, Image Intensifier	Shielded

Tr Mov	Com	Fuel	Fuel	Config	Susp	Armor
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Mov	Cap	Cons				
155/109	36/25/3	662	221	Trtd	T4	TF6 TS4 TR4 HF8 HS4Sp HR4

Fire Control	Stabilization	Armament	Ammunition
+2	Good	8xStinger Launchers, 30mm-3 ChainGun, MAG	16xStinger SAMs, 1800x30mm, 1200x7.62mm

GDLS M759 Blazer

Country of Origin: United States

Notes: This was another one of the weapons systems being studied to replace the M163A1 PIVAD; several prototypes were built, but it was not picked up for duty. (Again, I made up the nomenclature myself.)

Twilight 2000 Notes: This is an M113A2 or A3 with a Blazer anti-aircraft turret installed in the rear. The rear passenger area is taken up with the turret and ammunition and fire control mechanisms. The Blazer installation on the M113 chassis has one Stinger box, with a radar unit being added instead of the second box. This vehicle was a substitute standard within the US Army (and was mostly employed in National Guard units), and was also found in many countries also using the M113 series.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$290,882	D, A	200 kg	12.8 tons	4	16	Thermal Imaging, Image Intensification, Radar	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
110/77	26/18/3	360	96	Trtd	T2	TF6 TS4 TR4 HF6 HS4 HR4

Fire Control	Stabilization	Armament	Ammunition
+2	Good	4xStinger Launchers, 30mm-3 ChainGun, MAG	12xStinger missiles, 1200x30mm, 1200x7.62mm

GDLS M924 Bradley ADATS Vehicle

Country of Origin: United States

Notes: This is one of those systems developed to utilize the Canadian ADATS system. It was not placed into production. (I made up the nomenclature myself for this one, too, as well as for the M925 below.)

Twilight 2000 Notes: Starting in 1995 as an experiment, an ADATS system was fitted to an M2 Bradley chassis. When the Twilight War picked up, some 75 more of these vehicles were ordered for mechanized and armored divisions being posted to the Middle East. These vehicles gave a good accounting of themselves against both aircraft and armored vehicles, and were well liked by their crews, as they offered somewhat more protection than the M113-based ADATS vehicle. The turret is identical to that fitted to the M113-based ADATS, with upgraded sensors.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$366,097	D, A	300 kg	29 tons	4	13	FLIR, Image Intensification, Radar	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
157/110	37/26/4	662	221	Trtd	T4	TF5 TS4 TR4 HF8 HS4Sp HR4

Fire Control	Stabilization	Armament	Ammunition
+3	Basic	8xADATS Launchers	16xADATS Missiles

GDLS M925 Bradley ADATS Vehicle

Country of Origin: United States

Notes: This experimental ADATS system was developed mostly as a proof-of-concept vehicle, and never really meant for production.

Twilight 2000 Notes: This is a more heavily armed variant of the M924, with an autocannon and twin machineguns supplementing the ADATS missile system. This enabled it to engage closer-ranged targets as well as personnel. In this vehicle, the ADATS turret is topped with a superstructure containing the autocannon and twin machineguns. This vehicle was considerably more rare than the M924, being produced for only about a year and a half at a low rate starting in 1996. Most were also sent to the Middle East, but some were retained and took part in the fighting in the American Southwest. Its crews liked the firepower, but the high silhouette made them very vulnerable.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
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\$409,775	D, A	200 kg	31 tons	4	13	Thermal Imaging, Image Intensification, Radar	Shielded
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Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor	
150/105	35/25/3	662	221	Trtd	T4	TF5 TS4 TR4 HF8 HS4Sp HR4	

Fire Control	Stabilization	Armament		Ammunition
+3	Fair	8xADATS Launchers, 25mm Bushmaster autocannon, 2xM2HB		12xADATS missiles, 500x25mm, 2000x.50

GDLS M990 Chamberlain

Country of Origin: United States

Notes: This vehicle does not exist in real life; it is an invention of the designers at GDW. I did, however, christen the fictional vehicle the "Chamberlain," as well as add in some back story.

Twilight 2000 Notes: This is a limited production vehicle for use by US Army light divisions. It is a LAV-75 chassis topped with a turret armed with twin 30mm Bushmaster II autocannons, aimed by radar. The turret has a very effective stabilization system that allows the autocannons to fire accurately even when traveling at full speed. This, combined with its speed and agility, made it a hated commodity among the pilots that had to fly against it. The hull has two hatches on the front deck for the driver and gunner, and the commander has a hatch on the turret deck.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$182,350	D, G, AvG, A	500 kg	15 tons	3	24	FLIR, Radar, Passive IR	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor	
153/107	36/25	520	106	Trtd	T2	TF10 TS5 TR5 HF12 HS4 HR4	

Fire Control	Stabilization	Armament		Ammunition
+4	Good	2x30mm Bushmaster II Autocannons, MAG (C)		500x30mm, 1200x7.62mm

GDLS M1002 Miller AGDS

Country of Origin: United States

Notes: The M1002 is based on an article by Asher Sharoni and Lawrence Bacon in the Jul-Aug 1996 issue of *Armor* magazine.

Notes: This rare modification of the M1 Abrams was named for Seaman Dorie Miller, an African-American cook aboard the *USS West Virginia* during the Japanese attack on Pearl Harbor; Miller, despite having no antiaircraft gunnery training, shot down several Japanese aircraft with a deck-mounted M2HB in the face of withering enemy fire. (It also marks the only time that an Army system was named after a sailor.) The Army felt this was an appropriate name due to Miller's prowess in antiaircraft gunnery as well as his heroism; however, naming an Army system after a Naval hero did generate a firestorm of controversy for a while. AGDS simply stands for "Air-Ground Defense System," noting that the M1002 was meant to be an effective system for attacking ground targets as well as being an air defense system. The Miller was first proposed as the late 1990s, and put into limited production in 1994; however, when hostilities erupted, it was felt that tanks were needed more than a heavily-armored AAA vehicle, and production was halted in mid-1996, after only 52 Millers were produced. Some 30 M1002s were assigned to the 24th Infantry Division and went to the Middle East; most of the rest were sent to Europe, except for five that went to the 2nd Infantry Division in Korea, and two that were somehow acquired by the Texas Army National Guard's 49th Armored Division and remained in the US. They acquitted themselves quite well in all cases, and half of them survived the Twilight War in a more-or-less intact condition, eventually becoming museum pieces or (in a few unlucky cases) becoming range targets or being stripped.

The hull of the Miller is based on that of the IPM1 Abrams I chassis. The turret is enlarged and extends almost to the rear end of the chassis, but is also about 50mm shorter in height than that of the M1; it is, however, a little wider than that of the M1. The new turret is also heavily armored, though not as much as that of the M1. Despite the large turret, the interior is still rather cramped, as the turret contains the sophisticated fire control suite, a decent amount of ammunition for its weapons, and its pop-up missile box. The M1002 has not only antiaircraft fire control and tracking equipment, but equipment for ground engagements as well. Though the M1002 is equipped with a pair of autocannons, its primary weapon system is considered to be its ADATS missiles. The launchers are contained in a pair of six-round boxes, one of each side of the turret; the front end pops up before launch to a 45-degree angle; inside the turret on each side is a loading door which allows the launcher to be reloaded from under armor. The ADATS system is not only useful against aircraft and helicopters, but can engage the heaviest armored vehicles as well, making the M1002 quite the threat.

The secondary weapon system of the M1002 is its pair of 35mm Bushmaster III autocannons. The autocannons can use a small phased-array radar on the right front of the turret or the primary radar, or use a laser rangefinder with an advanced fire control computer. The guns' radar has a range of 10 kilometers against air targets or low-flying aircraft and helicopters, or 5 kilometers against ground targets. The pair of autocannons have the unusual ability to be fired either both together or one at a time; single-gun fire can be done to conserve ammunition, and

the dual-feed capability of the Bushmaster III is present on both guns. The autocannons can be elevated up to 90 degrees or depressed up to -5 degrees.

Both weapons systems are linked to a radar tracking/targeting system with a range of 25 kilometers against air targets, 15 kilometers against low-flying aircraft and helicopters, and 10 kilometers against ground targets. The radar has integrated IFF capability. The M1002 can also link itself via a digital radio link to other friendly air defense radars within 5 kilometers instead of using its own radar, reducing its vulnerability while extending target detection range. M1002s operating within 5 kilometers of each other can also share their radar information via the same sort of link. (The ADATS missiles themselves are laser-guided, however.) Ground and air targets can also be detected by a high-resolution LLTV system with a range of 9 kilometers or an advanced FLIR seeker with a range of 6 kilometers. Though there is only one radar dish, this dish and its mount are somewhat armored. The radar mount also has the LLTV and FLIR for the ADATS missiles, and is on an extendible mast that can extend the sensors up to 1.5 meters above the turret. The autocannons have their own sensors, fire control computer, and a separate laser rangefinder. Both the ADATS missiles and autocannons can be firing at the same time, each using their own sensors and fire control suite; note, however, that any ADATS targets must be within 30 degrees on either side of the front of the turret. If necessary, the fire control system of one weapon can be used to guide the other weapon system; however, this cuts the Fire Control modifier to +2.

The ammunition for the autocannons as well as the ADATS missile reloads is kept in separate armored compartments behind blast doors, and have blow-off panels like those of the M1. The compartments for the autocannon ammunition are on each side of front of the turret, and the blow-off panels blow upwards. The compartment for the ADATS reloads is at the rear of the turret, and again blows off upwards. The ADATS missile boxes also have blow-out panels in case they are hit and the missiles explode. As with the M1, if an ammunition hit calls for the vehicle to be destroyed, the M1002 is not destroyed. Instead (in game terms), the ammunition in the compartment is destroyed, the armament, sensors, and electronics each take minor damage, and each member of the crew except the driver takes 30 points of concussion damage. As the ammunition of the M1002 is contained in three separate armored compartments, an ammunition blow-out in one compartment does not mean that all ammunition on board is destroyed; instead, the compartment hit will depend upon the angle at which the enemy fire is coming from; there is a 33/34/33 chance that an ammunition hit will take out the autocannon ammunition on one side or the missile box on that side or the ADATS missile reloads compartment.

The driver is in his customary position in the hull front, and has the same controls as on the M1. The turret crew consists of a gunner, who has control over both armament systems and both sets of sensors and fire control systems via LCD screens, and the commander. The commander has a hatch on the turret deck in the center, which is also used by the gunner, and the commander has a pintle-mounted weapon for use against close targets or assaulting infantry. The commander can control the autocannons and use the autocannons' fire control suite and sensors via LCD screens, but his ADATS fire control sights are relatively rudimentary and give only a Fire Control modifier of +3.

The M1002 uses the same 1500-horsepower AGT-1500 gas turbine engine that the M1 uses. This is a multi-fuel engine, capable of burning gasoline, diesel, an ethanol/gasoline or diesel mix of up to 20%, JP-4 or JP-8 jet fuel, or kerosene; *in extremis*, the AGT-1500 can also burn pure ethanol or methanol with some modification. It is coupled to an automatic transmission. The driver has a conventional gas and brake pedal, and steers the M1002 via a T-shaped yoke. The suspension is the same as that of an M1 and is excellent, giving a good ride on and off roads and contributing to the stabilization of the M1002's autocannons as well as reducing crew fatigue. The M1002 is rather heavy, however, which somewhat negates the advantages of the power of the engine. On each side of the turret are a cluster of six smoke/flare grenade launchers. The M1002 has the same 5.6kW APU as found on the M1A2 and some M1A1s, as well as an air conditioner and a heater; the APU uses 11 liters of fuel per hour, and uses fuel from the M1002's fuel tanks. A small hot plate is tucked into a small space in the left front corner of the turret, as well as a 10-liter water tank. The M1002 is equipped with a GPS navigation system with a mapping/navigation computer.

The M1002 was often nicknamed the "Combat Cadillac" by US troops due to the plethora of armament and features it carries.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$2,466,323	D, G, AvG, A	630 kg	63 tons	3	34	Image Intensification (D), Advanced Image Intensification (G, C), Advanced FLIR (G, C), Radar (G, C)	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
152/107	32/23	1911	1255	Trtd	T6	TF60Cp TS24Sp TR15 HF220Cp HS26Sp HR19*

Fire Control	Stabilization	Armament	Ammunition
+5	Good**	2x35mm Bushmaster II Autocannons, 12xADATS Launchers, M2HB (C)	1100x35mm, 18xADATS Missiles, 600x.50

*The mount and mast for the main radar has an AV of 7; the dish itself has an AV of 3.

**Stabilization for the ADATS missile system is Basic.

GIAT/Thyssen-Henschel Dragon

Notes: This tracked antiaircraft gun is a product of cooperation between France and Germany. It consists of a SABRE turret mounted on a modified TAM light tank chassis. The turret is equipped with a search and tracking radar and twin 30mm HS-831A autocannons. The radar has a range of 15km and can simultaneously search and track. It is capable of searching even for low-altitude or hovering targets. The guns can be radar directed, but optical backup is provided. The driver has a hatch on the front deck, the commander and gunner on the turret deck,

and there is a ramp in the rear. This vehicle was not developed beyond several prototypes, primarily due to budgetary difficulties.

The engine is an MTU MB-883 Ka500 diesel engine developing 720 horsepower. It has a basic turbocharger, and uses an automatic transmission. The engine, combined with light weight, gives the Dragon lots of agility. The Dragon carries a pair of two 200-liter armored drums of extra fuel, to extend range. Though these are in fact vulnerable enemy fire, the tanks do have an AV of 6 from all angles and are self-sealing. The tanks are carried above the level of the deck, allowing fuel to easily flow out of them. The Dragon is NBC-Sealed and NBC-filtered fans to help increase comfort; it is not, however, an air conditioner. The Dragon's armor is primarily of all-welded steel. The Dragon is well protected for its class of vehicle; this is due to the vehicle being based on a light tank instead of an APC or IFV. The hull floor armor is, to its credit, somewhat thicker than one might expect from its class of vehicle. The Dragon is capable of fording up to four meters of water. Suspension is by torsion bars. The Dragon is equipped with the TAM's inertial navigation system.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$348,069	D, A	516 kg	31 tons	3	16	Radar (15 km), Passive IR (D), Image Intensification (G, C)	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
161/112	45/31	650+400	268	Trtd	T4	TF16 HS7 HR7 HF32 HS6 HR6*

Fire Control	Stabilization	Armament	Ammunition
+3	Fair	2x30mm HS-831A Autocannons	1500x30mm

*Turret Roof Armor is AV6. Hull Roof Armor is AV5, Hull Floor armor is AV6, except for the front third of the floor, which is AV7.

IOC Ze'ev MAGS AA

Country of Origin: Israel

Notes: This vehicle does not exist in real life; it was invented by Frank Frey of the former GDW.

Twilight 2000 Notes: This is an antiaircraft variant of the basic system that mounts two 35mm autocannons in a remote turret and fittings for mounting a hypervelocity rocket pod on each side of the turret.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$264,054	D, A	400 kg	18 tons	3	20	Thermal Imaging, Image Intensifier	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
164/116	41/29	650	179	CiH	T4	TF7 TS7 TR4 HF16 HS12Sp HR6

Fire Control	Stabilization	Armament	Ammunition
+4	Good	Twin 35mm autocannons, twin LOSAT tubes	600x35mm, 10xLOSAT ADATS missiles

JSC 2S38 Derivaciya

Country or Origin: Russia

Seen In: Experiments to produce a more effective defense gun for Tunguska SAM sites.

Notes: The 2S38 is a new Russian concept vehicle, to replace the AAA vehicles used to protect various SAM installations (The Tunguska is most often mentioned.) The autocannons are also often mentioned to replace the autocannons on the Pantsyr gun/missile system. As of 2020, the 2S38 has tentative approval from Russian MoD, but the current 2S38 is definitely a test vehicle, primarily due to the lack of advanced sensors and the miniscule amount of ammunition onboard, as well as the small turret, barely large enough for the autocannon, a coaxial, and the gunner, who has a big job contorting himself to use all the AAA sensors and lack of a collating-type computer to bring the information. Nonetheless, the 2S38 is expected to yield a final vehicle by 2022, and be in full production and service the following year.

The 2S38 is based on a BMP-3 chassis, with the turret replaced with (a rather small) turret mounting a long-barreled 57mm autocannon (some say it was derived from the S-60, and some say the ammunition was based on that of the S-60, and others say it is a development from the ground up with only a nod and wink to the S-60.) The current turret is essentially a large RWS, with the gunner well down in the turret basket, the driver in the usual place, and the commander also having a place in the turret basket, though he can access a hatch at the top right of the turret. Currently, there is no provision for a commander's weapon, though the "coaxial" weapon is in fact mounted on an independent-operating RWS, which is on top of the main RWS. The 2S38's job is to intercept helicopters, cruise missiles, UAVs, low, slowly flying aircraft, and supposedly some artillery rockets and air-fired ATGMs. The 2S38 is able to use the rest of the SAM site's radar and IR detection systems. A secondary target of the autocannon is light armor, unarmored vehicles, and troops in the open.

The 2S38 dispenses with onboard radar, using advanced FLIR to detect targets instead. In addition, advanced image intensification is also used to acquire targets. The 2S38 has automatic lock-on and gun-bearing systems, which lay the gun to intercept the selected target.

The hull is essentially a BMP-3 chassis, and has the same armor level as a BMP-3; the turret is said to provide protection against 30mm AP rounds from front and 14.5mm rounds from the sides and rear. Protection of the chassis may be increased with the addition of ERA. The 2S38 is also equipped with NBC Overpressure protection. Like the BMP-3, the 2S28 is fully amphibious, propelled by waterjets in the water. The chassis uses the same 500-horsepower engine of the BMP-3. The transmission is manual. The suspension is hydropneumatic and can be raised and lowered (normally done in cases of air transport or when needing to assume a hull-down position). The 2S38 inherits the BMP-3's self-entrenching blade.

There is a cramped space in the rear of the 2S38, enough for a MANPADS team to ride along with a few reload missiles.

The 2S38, in its current iteration, carries only 148 rounds for its main gun. The 7.62mm gun has likewise a small amount of ammunition available. This is the most telling feature that marks it as a development vehicle than an active-service vehicle.

The 2S38's 57mm autocannon has several new types of ammunition to fire. The fire control system has an extended-range, fast-response laser designator, because one of the 2S38's primary rounds is a laser-guided smart HE-FRAG smart shell. The new gun is not limited to the ammunition of the old S-60, and the gun is dual-feed belt-fed rather than being clip-fed like the S-60. (It is potentially capable of handling much larger amounts of ammunition.)

The 2S38 is hooked into the GLONASS system; it is conjectured that production versions will have a BMS and Vehicle State systems.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$523,778	D, G, AvG, A	364 kg	18 tons	3	11	FLIR (G, C), 2 nd Gen Image Intensification (G, C), Image Intensification (D)	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
186/130	52/36	690	185	Trtd	T3	TF12Sp TS6Sp TR4 HF10Sp HS6Sp HR5

Fire Control	Stabilization	Armament	Ammunition
+4	Good	57mm 2S38 Autocannon, Pechneg (RWS)	154x57mm, 400x7.62mm

KBP ZSU-30-6

Country of Origin: Russia (Soviet Union)

Notes: Though based on a possible SP AAA system the Soviets were studying in the 1980s, this vehicle does not actually exist in real life. The back story is my invention.

Twilight 2000 Notes: This little-seen antiaircraft vehicle is the result of three goals: the desire to produce an antiaircraft vehicle more effective than the ZSU-23-4, the use of aircraft cannon from attack aircraft grounded due to maintenance issues or damage, and the need to do both quickly and with as little additional expense as possible. The result of this was the ZSU-30-6, basically a modified ZSU 23-4 with slightly better radar and armed with the 30mm AO-17A Gatling gun from aircraft such as the SU-25 and SU-27 series aircraft. The result was a vehicle with similar capabilities to the US M163 PIVAD, but with a heavier-caliber autocannon. However, aircraft were becoming less common in the skies by the time this vehicle reached volume production, and the autocannon ended up being used more against light armored vehicles, soft-skinned vehicles, and personnel.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$110,796	D, A	800 kg	22 tons	4	18	Radar, Passive IR, Image Intensification	Enclosed

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
111/78	26/18	250	80	Trtd	T3	TF5 TS5 TR4 HF6 HS4 HR3

Fire Control	Stabilization	Armament	Ammunition
+2	Fair	AO-17A 30mm Autocannon	1500x30mm

Krauss-Maffei Leopard 1 ADATS

Country of Origin: Germany

Notes: This is a highly modified Leopard 1 chassis with an elevating arm for a sensor set and a pod containing ADATS missiles. The crew is contained in an elevated superstructure on the right side of the vehicle, each with his own hatch. The pod is automatically reloaded by lowering it to the rear of a set of opening in the hull deck to the rear of the superstructure. The pod may be elevated up to 5 meters above the vehicle. This vehicle was not developed beyond the drawing board phase.

Twilight 2000 Notes: This rather rare vehicle was delivered to the German and Danish armies shortly before the Twilight War, about 30 to Germany, and 5 to Denmark.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$448,355	D, G, AvG, A	500 kg	47.4 tons	3	28	FLIR, Radar	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
126/88	32/22	985	294	CiH	T6	TF4 TS4 TR4 HF38 HS10 HR8

Fire Control	Stabilization	Armament	Ammunition
+3	Basic	8xADATS launchers, MG-3 (C)	16xADATS missiles, 2750x7.62mm

LIW/Reunart G-6 Marksman

Country of Origin: South Africa

Notes: This vehicle was not developed beyond the drawing board/scale model phase.

Twilight 2000 Notes: This experimental South African system was placed into limited production during the Twilight War. It consists of a G-6 self-propelled howitzer chassis topped with the German Marksman turret (the same as on the Gepard and T-55 Marksman). There were a very few of these systems sent to Oman and the United Arab Emirates, but most of them were used by South African forces, more often in a ground support role than an air defense role.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$126,560	D, A	650 kg	40 tons	4	24	Radar, Image Intensification	Enclosed

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
118/46	30/12	700	186	Trtd	W(4)	TF15 TS6 TR6 HF18 HS6 HR5

Fire Control	Stabilization	Armament	Ammunition
+4	Fair	2x35mm KDA autocannons	480x35mm

MaK Wildcat

Country of Origin: Germany

Notes: This was never developed beyond the advanced prototype stage. The turret was also tried on several different chassis, but none of these were ever fielded either.

Twilight 2000 Notes: This is a light 6x6 antiaircraft vehicle for the protection of airborne, airmobile, and light divisions. They were welcome additions to those parts of the German Army, but they were rare outside the German ranks (with some serving in the Swiss and Austrian armies, and a very few serving with the British Army). The combination of small size, fast speed, and excellent fire control made them difficult and dangerous targets for enemy pilots to take out, and they were also useful against light armored vehicles, soft-skinned vehicles, and personnel. The driver's position is at the front of the hull, and the commander and gunner have hatches on the turret deck. In 1999, one of these vehicles was captured by the 82nd Airborne Division in Iran, and used by that division; how it got there was a mystery, since the crew of the Wildcat was killed outside of the vehicle before they could be questioned.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$134,596	D, A	300 kg	18.5 tons	3	16	Radar, Passive IR, Image Intensification	Enclosed

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
148/60	37/15	430	105	Trtd	W(4)	TF8 TS6 TR6 HF10 HS4 HR4

Fire Control	Stabilization	Armament	Ammunition
+3	Fair	2xMauser MK-30, MG-3	500x30mm, 1200x7.62mm

Rheimetall/Giat Dragon

Country of Origin: France/Germany

Notes: This tracked antiaircraft gun is a product of cooperation between France and Germany. It consists of a SABRE turret mounted on a modified TAM light tank chassis. The turret is equipped with a search and tracking radar and twin 30mm HS-831A autocannons. The radar has a range of 15km and can simultaneously search and track. It is capable of searching even for low-altitude or hovering targets. The guns can be radar directed, but optical backup is provided. The driver has a hatch on the front deck, the commander and gunner on the turret deck, and there is a ramp in the rear. This vehicle was not developed beyond several prototypes.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$100,837	D, A	600 kg	31 tons	3	24	Radar, Passive IR, Image Intensification	Shielded

Tr Mov	Com	Fuel	Fuel	Config	Susp	Armor
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Mov	Cap	Cons				
166/116	39/27	550+400	254	Trtd	T4	TF16 HS7 HR7 HF20 HS6 HR5

Fire Control	Stabilization	Armament	Ammunition
+3	Fair	2x30mm HS-831A Autocannons	1500x30mm

M48-Based Experimental and Drawing-Board AAA Vehicles

Country of Origin: US

Seen In: Various Book, Magazine, and Online Sources. However, all stats presented here are speculative or based on educated guesses or the small (more like tiny) amount of actual RL stats on the vehicles.

Notes: Well, this was fun (both is the actual and sarcastic meaning of the word “fun”). I think that most of the time, smoke was coming from my ears as my brain vented excess heat generated by statting all this out.

The vehicles shown here are M48-based. They are armed with anything from Avenger turrets the German Marksman turret. They have a variety of fire control systems, optics, and night vision equipment, and sometimes enhanced armor for the chassis and the turret. Common here are modified Avenger turrets mounted on various chassis.

The name “Roadrunner” used in the name of the entry is taken from the first mention I heard of such modifications, an entry on Juhlin’s Board by screen name shriek6. He posted a screen shot of a short article mentioning the Army Missile Command’s “Roadrunner configuration,” which was to be a Chaparral launcher on an unspecified chassis (my guess would be an M48).

Often, I am referring to memories of pictures I found here and there, and I no longer remember the actual source. (As I said, *Speculative*.) One day, I’ll go back through my books and magazines and put keywords in Bing and find what the sources of those pictures actually are.

I have been able to find several M48-based vehicles most of which were drawing-board-only vehicles, but also one or two that were sales prototypes made by GDLS and one that existed only as a model and a small amount of descriptive and technical information. Many of these used an up-armored M48 chassis, some use the 908-horsepower M60A3-type engines, and most have uprated electronics and optics. Most of the names I have assigned to the vehicles are simply made up and are not official names. (In most cases, no official name was found.)

Chaparral Roadrunner

This modification is mentioned in a short article by the US Army Missile Command. The chassis is not mentioned (other than being tracked), though as the US Army has a large amount of surplus M48s from when National Guard changed to M60s and later M1s, the use of a refurbished M48 chassis is likely. The article also mentions that such a vehicle would be able to shoot on the move, and have aircraft and tank killing ability. A picture I found on the internet showed such a vehicle with rails for a combination of AIM-9 and Hellfire missiles, and another picture shows a similar vehicle, but armed with ADATS missiles instead of Hellfires. (On these vehicles, sometimes the rails for the Hellfires or ADATS are outside of the Sidewinders – but there are not actually any pictures of a Roadrunner with ADATS on them. Other pictures show the Hellfires mounted on the Sidewinder rails instead of the Sidewinders. (For purposes of this statting, the vehicle will be armed with both Sidewinders and Hellfires/ADATS missiles.) Another picture I found in one of my books shows the Chaparral launcher mounted on an M48 chassis by itself with no additional missiles, but additionally armed with a Bofors L/70 40mm autocannon. In any case, the crew is in front of the vehicle, ahead of the Chaparral Turret, with hatches on the front deck, and driver on the left, gunner in the middle, and the commander on the right. Behind the crew seats is a space for crew equipment and things like rations and such. The gunner and commander have downlinked displays, and either may focus the radar or fire weapons. Crews generally have their personal assault rifles, and access to three pistols and ten fragmentation grenades, but there is no other armament but the onboard weapons.

The Hellfire-armed Roadrunner was trialed, but never adopted, nor did it proceed beyond a single prototype. The ADATS-armed version, supposedly, did not go beyond a mention that “I wonder if this would work with ADATS launchers...” and some rough sketches. The Bofors 40mm-armed version had excellent sketches and preliminary technical information, but never got off the drawing board.

Avenger Roadrunner

This is the Avenger turret mounted on an M48 chassis. In most cases the vehicle is shown up-armored (both the chassis and the turret) and the middle portion of the turret is somewhat larger. Some articles mention the turret’s M2HB replaced by an M242 25mm ChainGun, or 30mm MK30 30mm ChainGun. In most cases, the amount of ammunition carried onboard the vehicle is greatly increased, as it feeds from inside the M48. Most are armed with the standard Stinger missiles, but some pictures show the vehicle armed with Mistrals, and one picture I found in a magazine shows the turret armed with one box of Stingers and one box of Mistrals. The turret layout remains the same, with the gunner in the turret behind armored glass in the front, but to alleviate one of the biggest complaints of Avenger gunners, the turret is air conditioned. (The commander’s and driver’s positions are also air conditioned.) The driver is on the front left with the commander on the front right; the commander has a pintle-mounted weapon and a manually-rotating cupola.

I suspect that the pictures of Avenger Roadrunners I’ve found were Photoshop work instead of an actual photo; they look...well...*too* real. (Just my personal take.) Like the HMMWV itself, replacement of the M2HB with autocannons were proposed for the proposed M48-based Avenger. (I know the sentence sounds clumsy, but it does convey what I mean to say.)

Upgraded DIVADs

In several places, I have seen upgraded versions of the Sergeant York DIVAD system. These vehicles have several improvements; the simplest upgrade is the replacement of the radar with a radar system specifically designed for the DIVAD or one specially-modified for the DIVAD, along with upgraded displays, electronics, and night vision. Some keep the Bofors L/60 40mm autocannons; some change the Bofors L/60s for L/70s. Most, however, change the 40mm autocannons with 30mm Mk30 30mm ChainGuns, sometimes with the addition of boxes for Stinger missiles on each side, or a box of Stingers on one side and rails for up to four Hellfires on the other. (I’ll bet someone thought of putting ADATS rails on it, but someone thought he was some just staff weenie aide REMF who didn’t bear listening to or something like that.

Whatever it was, I have not found pictures or Photoshop work or even mentions of an ADATS armed version.) These missiles are on the outside of the turret outboard of the guns, and are on rotatable mounts/rails. In some literature, these were to be further upgraded with an M60A3's 908-horsepower engines; I have included this in the stats below. I have also assumed an M48A5 chassis (though the original DIVAD used an M48A3 chassis) with the M60A3's 908-horsepower engine, an automatic transmission, and a commander's machinegun.

M48 Marksman

To show the versatility of their Marksman AAA system (basically the Gepard turret with upgraded electronics and fire control), the Germans demonstrated for the US Army a Marksman turret on an M48 chassis. Reportedly, some members of the Army considered it interesting or even promising, but in the end the idea went nowhere. The upgrade is still being shopped to countries who have retired M48s. This upgrade includes the standard engine upgrade, and a GPS system with a mapping computer and display for the driver and commander.

Twilight 2000 Notes: The M48 Marksman was liberally distributed throughout the world, including the US Army, who ordered 438 of them before the Twilight War.

Upgraded DIVADS of various sorts were sometimes seen in the North American Theater, though most were simply 40mm L/60s with advanced fire control (known as M1591s) and those with L/70 autocannons and updated fire control (known as M1592s). There were at least 30 examples of DIVADs with 30mm Chainguns (M1933s), and there were some 20 each of the type with 30mm Chainguns and with a Stinger Box on each side (M1594s) and those with a Stinger box on one side and Hellfires on the other (M1595s).

The Avenger Roadrunners were thought a good idea and also found themselves all over the world, including some operated by the German Army, Dutch Army, Danish Army, Norwegian Army, Turkish Army, Hellenic Army, South Korean Army, and Japanese Ground Self-Defense Forces, and some 400 were used by these armies. All in all, over a thousand total were built, as production and export started well before the War started. The US Army took into service the lion's share of these vehicles, with some 504 ordered, and equipping most heavy divisions' Air Defense brigades. Most of these were simply the Avenger turret with the M2HB replaced with an M242 (M1611), though some retained the M2HB (M1610). Some 100 used 30mm autocannons instead (M1612s). American Avenger Roadrunners were all issued with Stinger boxes, as were South Korean and Japanese Avenger Roadrunners. South Korean and Japanese Avenger Roadrunners were armed with M242s instead of M2HBs; European Avenger Roadrunners were generally armed with 30mm autocannons, though a few were armed with M242s. The European Avenger Roadrunners generally used Mistral missiles instead of Stingers. Some 200 of these vehicles were ordered by European countries, while South Korea and Japan had 100 between the two of them. Avenger Roadrunners generally didn't start the War with mixed missiles, though in Europe, the ability to use mixed missiles was often taken advantage of. The other 104 Roadrunners Avengers mentioned were bought by a variety of nations who had old M48s.

The Chaparral Roadrunner was a largely US Army vehicle, though the Dutch and Germans also used some of them, generally to good results. Most were armed with Sidewinders and ADATS missiles, though many were actually armed with Sidewinders and Hellfires. (The Germans preferred the ones with a Sidewinder/ADATS mix, while the Dutch preferred a Sidewinder/Hellfire mix.) The US Army generally used the Chaparral Roadrunner with the Sidewinder/ADATS mix, designating them the M1624, but also used the type with the Sidewinder/40mm mix, which they designated M1625. In the North American Theater, most Chaparral Roadrunners were M1625s, while in the European and African Theaters, they were usually M1624s. (These vehicles, of either type, were actually fairly rare in the Middle Easter Theater and the Far Eastern Theater, though during the War some were transferred from the African Theater to the Missile East, usually by ship.)

Vehicle	Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
Chaparral Roadrunner 1	\$4,459,026	D, A	623 kg	39.99 tons	3	26	Surveillance Radar (30 km) (G, C), Tracking Radar (20 km) (G, C), IFF (30 km) (G, C), FLIR (G, C)	Shielded
Chaparral Roadrunner 2	\$4,586,033	D, A	630 kg	41 tons	3	27	Surveillance Radar (30 km) (G, C), Tracking Radar (20 km) (G, C), IFF (30 km) (G, C), FLIR (G, C)	Shielded
Chaparral Roadrunner 3	\$5,230,875	D, A	720 kg	43.25 tons	3	27	Surveillance Radar (30 km) (G, C), Tracking Radar (20 km) (G, C), IFF (30 km) (G, C), FLIR (G, C)	Shielded
Avenger Roadrunner 1	\$729,400	D, A	644 kg	41.98 tons	3	36	IFF (30 km) (G), 2 nd Gen FLIR (G, C), Image Intensification (D)	Shielded
Avenger Roadrunner 2	\$839,088	D, A	654 kg	41.17 tons	3	38	IFF (30 km) (G, C), 2 nd Gen FLIR (G, C), Image Intensification (D)	Shielded
Avenger Roadrunner 3	\$835,931	D, A	653 kg	41.39 tons	3	38	IFF (30 km) (G, C), 2 nd Gen FLIR (G, C), Image Intensification (D)	Shielded

Upgraded DIVAD 1	\$2,665,138	D, A	672 kg	49.35 tons	3	34	Surveillance Radar (30 km) (G), Tracking Radar (20 km) (G), IFF (30 km) (G), 2 nd Gen FLIR (G, C), 2 nd Gen LLTV (G, C), Image Intensification (D)	Shielded
Upgraded DIVAD 2	\$2,670,547	D, A	673 kg	49.45 tons	3	34	Surveillance Radar (30 km) (G), Tracking Radar (20 km) (G), IFF (30 km) (G), 2 nd Gen FLIR (G, C), 2 nd Gen LLTV (G, C), Image Intensification (D)	Shielded
Upgraded DIVAD 3	\$2,685,508	D, A	668 kg	45.03 tons	3	34	Surveillance Radar (30 km) (G), Tracking Radar (20 km) (G), IFF (30 km) (G), 2 nd Gen FLIR (G, C), 2 nd Gen LLTV (G, C), Image Intensification (D)	Shielded
M48 Marksman	\$2,940,966	D, A	698 kg	44 tons	3	40	Surveillance Radar (12 km) (G, C), Tracking Radar (10 km) (G, C), 2 nd Gen FLIR (G, C), Image Intensification (D)	Shielded

Vehicle	Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
Chaparral Roadrunner 1	143/100	40/28	1457	297	Trtd	T6	TF5Sp HS5 HR5 HF68Sp HS18Sp HR8
Chaparral Roadrunner 2	140/98	39/27	1457	297	Trtd	T6	TF5Sp HS5 HR5 HF68Sp HS18Sp HR8
Chaparral Roadrunner 3	134/94	37/26	1457	297	Trtd	T6	TF10Sp HS7Sp HR5 HF68Sp HS18Sp HR8
Avenger Roadrunner 1	137/96	38/27	1457	297	Trtd	T6	TF20Sp TF15 TR10 HF68Sp HS18Sp HR8
Avenger Roadrunner 2	140/98	39/27	1457	297	Trtd	T6	TF20Sp TF15 TR10 HF68Sp HS18Sp HR8
Avenger Roadrunner 3	139/97	39/27	1457	297	Trtd	T6	TF20Sp TF15 TR10 HF68Sp HS18Sp HR8
Upgraded DIVAD 1	133/93	37/26	1457	336	Trtd	T6	TF20Sp TS20Sp TR20 HF62 HS15 HR8
Upgraded DIVAD 2	133/93	37/26	1457	336	Trtd	T6	TF20Sp TS20Sp TR20 HF62 HS15 HR8
Upgraded DIVAD 3	143/100	40/28	1457	336	Trtd	T6	TF20Sp TS20Sp TR20 HF62 HS15 HR8
M48 Markman	146/102	41/28	1457	336	Trtd	T6	TF18Sp TS7Sp TR7 HF68Sp HS18Sp HR8

Vehicle	Fire Control	Stabilization	Armament	Ammunition
Chaparral Roadrunner 1	+3	Fair	4xMIM-72 Sidewinder Launchers, 6xAGM-114 Hellfire Launchers	8xMIM-72 Sidewinder Missiles, 12xHellfire Missiles
Chaparral Roadrunner 2	+3	Fair	4xMIM-72 Sidewinder Launchers, 4xMIM-146 ADATS Launchers	8xMIM-72 Sidewinder Missiles, 8xMIM-146 ADATS Missiles
Chaparral Roadrunner 3	+3	Fair	4xMIM-72 Sidewinder Launchers, 40mm L/70 Autocannon	8xMIM-72 Sidewinder Missiles, 250x40mm
Avenger Roadrunner 1	+2	Basic	8xStinger Launchers or 8xMistral Launchers or 4x Stinger and 4xMistral Launchers, M2HB, M240 (C)	32xStinger Missiles or 32xMistral Missiles or 16xStinger and 16xMistral Missiles; 3000x.50, 1000x7.62mm
Avenger	+2	Basic	8xStinger Launchers or 8xMistral Launchers	32xStinger Missiles or 32xMistral

Roadrunner 2			or 4x Stinger and 4xMistral Launchers, M242 ChainGun, M240 (C)	Missiles or 16xStinger and 16xMistral Missiles; 1550x25mm, 1000x7.62mm
Avenger	+2	Basic	8xStinger Launchers or 8xMistral Launchers	32xStinger Missiles or 32xMistral
Roadrunner 3			or 4x Stinger and 4xMistral Launchers, M230 ChainGun, M240 (C)	Missiles or 16xStinger and 16xMistral Missiles; 1300x30mm, 1000x7.62mm
Upgraded DIVAD 1	+3	Fair	2x40mm Bofors L/60 Autocannons, M240 (C)	580x40mm, 2500x7.62mm
Upgraded DIVAD 2	+3	Fair	2x40mm Bofors L/70 Autocannons, M240 (C)	580x40mm, 2500x7.62mm
Upgraded DIVAD 3	+3	Fair	2x30mm M230 ChainGuns, 8xStinger Launchers or 4xStinger Launchers and 4xHellfire Launchers, M240 (C)	775x30mm, 32xStinger Missiles or 16xStinger Missiles and 12xHellfire Missiles, 2500x7.62mm
M48 Marksman	+3	Good	2x35mm KDA Autocannons, M240 (C)	800x35mm, 2500x7.62mm

OTO Melara OTOMATIC

Notes: This is a heavy antiaircraft gun built on the chassis of the Leopard 1 tank, many of which the Italians had after adopting the C-1 Ariete in the early 1990s. The regular tank turret is removed and replaced with a larger turret mounting a 76mm radar-directed antiaircraft gun known as the OTO-Breda Super Rapid, a gun more normally found on ships rather than land mountings. Unfortunately, the Italian Army did not perceive a need for a land-based heavy-caliber antiaircraft gun, feeling that a better job could be done with SHORAD SAMs. Only two prototypes were produced. This came back to bite them in recent years, as the rise of FPV UAVs and drones meant that attacking them with SAMs was cost prohibitive, and such a system might have buyers today. Nonetheless, systems like the OTOMATIC have not seen a resurgence, though many countries are racing to put antiaircraft guns back into service.

The fire control equipment is advanced, with radar ranging and computer-controlled acquisition, with laser sights and backup TV sights and optical sights for use against land vehicles. The vehicle also incorporates a laser designator for use in conjunction with units firing laser-guided missiles. The radar suite consists of an S-band SMA VPS-A05 search radar with a range of 20 kilometers against most aircraft and 8 kilometers against hovering helicopters. This radar is paired with a Ka-band SMA VPG-A06 fire control radar, and the two are tied together with a fire control computer. The computer can slave the electro-optical suite and laser rangefinder into a coherent, accurate whole; even the vision blocks and telescopic sights, though not slaved to the sights, are designed to enhance spotting aerial targets (though of course they can be used against ground threats). Depending upon the targets (whether they are at low-altitude or higher altitude) can track from 8-24 targets. The OTOMATIC is equipped with an Advanced IFF system for target identification. The OTOMATIC may network and datalink with other appropriately equipped antiaircraft systems and radars.

The autocannon is a derivative of the OTO Breda Super Rapid naval gun and is of higher caliber than most modern flak guns. Normally, the Super Rapid fires in six-round bursts for use against helicopters, but longer bursts or full automatic fire may be used against fast or maneuvering targets, or ground targets may be engaged with semiautomatic fire. The computer usually provides the amount of shells for a given fire solution, but the computer may be overridden by the gunner or commander at any time. Normally, 78 antiaircraft and 12 antiarmor shells are carried for the 76mm ammunition supply, with 26 antiaircraft shells and three antiarmor shells loaded into the gun. The elevation limit is +80 degrees while depression limit is -5 degrees. With all circumstances right, the time from radar detection to a shoot-down could be as little as six seconds. Spent cases are automatically ejected from the rear of the turret.

The OTOMATIC is equipped with a very efficient fire suppression system, NBC overpressure and radiological shielding, and an 8kW APU to generate power when the engine is switched off. The gunner has a seat to the right of the gun, with the commander to the right and rear of him, and a single circular hatch above him. The loader is to the left of the gun. On either side of the turret there is a large door, used both for crew entry and replenishing the ammunition supply and loading equipment. The driver is on the front right with the APU to his left. The OTOMATIC has an NBC Overpressure system with a collective NBC backup.

Production examples would have been based on Leopard 1A2 hulls, which the Italian Army had phased out in favor of more advanced Leopard 1s and later, C-1 Arietes. This hull had upgraded glacis armor and a fully automatic transmission. The engine is a Daimler-Benz DB-838 830-horsepower supercharged diesel which can also run on JP4 jet fuel. The engine and transmission are combined into one powerpack that can be removed as a unit. The suspension is optimized for some of the roughest terrain around. The tracks are US-designed, but can be replaced with German-designed anti-skid tracks. In either case, the tracks have rubber track pads.

The original OTOMATIC system tested was placed on a modified Palmaria self-propelled howitzer chassis, which OTO-Melara had been marketing for some time with few buyers. The turret is the same as above. The engine is an MTU MB-837 Ea-500 diesel with 750 horsepower, but with manual transmission (this is not the same engine as on the OF40, being instead being a modification of the Leopard 1's engine). The engine and transmission are unitary, making for quick and easy powerpack changes and installations, even in the field if the necessary equipment is available. Armor for the hull is a reduced Palmaria-howitzer version of that on the OF40, giving the Palmaria pretty decent armor protection for a self-propelled howitzer. The hull armor is steel. The tank-inherited suspension is also heavy and stable, with cross-country gallops causing not too severe bumps.

Vehicle	Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
OTOMATIC (Leopard 1A2 Chassis)	\$1,065,615	D, AvG, A	654 kg	47 tons	4	22	Radar (20 km), Passive IR (D), Image Intensification (G, C), FLIR (G)	Shielded
OTOMATIC (Palmaria Chassis)	\$1,053,472	D, G, AvG, A	628 kg	46 tons	4	22	Radar (20 km), Passive IR (D), Image Intensification (G, C), FLIR (G)	Shielded

Vehicle	Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
OTOMATIC (Leopard 1A2 Chassis)	129/91	36/25	985	308	Trtd	T6	TF30 TS12 TR11 HF45 HS12Sp HR8
OTOMATIC (Palmaria Chassis)	122/85	34/24	800	222	Trtd	T5	TF30 TS12 TR11 HF32 HS12 HR8

Fire Control	Stabilization	Armament	Ammunition
+4	Fair	76mm OTO-Breda Super Rapid Autocannon, MG43/59 (C)	90x76mm, 1000x7.62mm

Stalowa Wola Sopel

Notes: The system is based on an SPG-2A Opal APC (which in turn is based on a stretched MT-LB), topped with a turret mounting an autocannon and missile launchers. Sopel is a play on words based on the Opal APC chassis, but also means *icepick* in Polish. Early versions were armed with SA-7 missiles, but two prototypes were armed with SA-14 missiles, and one was made with SA-16 missiles. The four prototypes were made with ZU-23 autocannons, but development of the Sopels could have armed the Sopel with 2A38 30mm autocannons (the same as mounted on the ZSO-30-4). Another possible development, which did not get off the drawing board, would have armed the Sopel with a single KDA autocannon. As an Opal variant, the Sopel is powered by an SW680T turbocharged diesel engine developing 300 horsepower.

The Stalagmit is a further development of the Sopel, which is armed with the same 2A14 autocannons as the ZSU-23-4 (which are functionally the same as the ZU-23 autocannons), and mounts four missile launchers as well as better sighting equipment, including a laser rangefinder and a long-range electro-optical viewer/sight..

The Sopel and Stalagmit were produced only as prototypes or drawing board studies, and they never went into production, though Stalowa Wola says it is willing to undertake production upon demand. Stalowa Wola is also willing to produce the Sopel or Stalagmit turret for mounting on another chassis if desired.

Twilight 2000 Notes: This Polish vehicle began production just before the Twilight War, and as it was produced by the same factories as the BMP-40 and BWP-2000, the production facilities were destroyed early in the war, and few examples of the Sopel were made. Most of the few that were made were manufactured with the 30mm autocannons. 35mm-armed Sopels did not appear in the Twilight 2000 timeline.

Vehicle	Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
Sopel (23mm)	\$384,477	D, A	390 kg	16 tons	3	12	Thermal Imaging (G, C), Passive IR (D)	Enclosed
Sopel (30mm)	\$407,812	D, A	392 kg	16.57 tons	3	12	Thermal Imaging (G, C), Passive IR (D)	Enclosed
Sopel (35mm)	\$412,050	D, A	392 kg	16.42 tons	3	12	Thermal Imaging (G, C), Passive IR (D)	Enclosed
Stalagmit	\$517,672	D, A	391 kg	16.06 tons	3	12	Thermal Imaging (G), 2 nd Gen Image Intensification (G, C), Passive IR (D)	Enclosed

Vehicle	Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
Sopel (23mm)	135/95	38/26/4	450	111	Trtd	T4	TF3 TS3 TR3 HF5 HS3 HR3
Sopel (30mm)	132/92	37/26/4	450	111	Trtd	T4	TF3 TS3 TR3 HF5 HS3 HR3
Sopel (35mm)	133/93	37/26/4	450	111	Trtd	T4	TF3 TS3 TR3 HF5 HS3 HR3
Stalagmit	135/94	37/26/4	450	111	Trtd	T4	TF3 TS3 TR3 HF5 HS3 HR3

Vehicle	Fire Control	Stabilization	Armament	Ammunition
Sopel (23mm)	+2	Fair	2x23mm ZU-23 Autocannons, 2xSA-7, SA-14, or SA-16 SAM Launchers, PKT (C)	1800x23mm, 8xSA-7, SA-14, or SA-16 SAMs, 1000x7.62mm
Sopel (30mm)	+2	Fair	2x30mm 2A38 Autocannons, 2xSA-7, SA-14 or SA-16 SAM Launchers, PKT (C)	1800x30mm, 8xSA-7, SA-14, or SA-16 SAMs, 1000x7.62mm
Sopel (35mm)	+2	Fair	35mm KDA Autocannon, 2xSA-7, SA-14 or SA-16 SAM Launchers, PKT (C)	1800x35mm, 8xSA-7, SA-14, or SA-16 SAMs, 1000x7.62mm
Stalagmit	+4	Fair	2x23mm 2A14 Autocannons, 4xSA-7, SA-14, SA-16, or SA-18 SAM Launchers, PKT (C)	1800x23mm, 12xSA-7, SA-14, SA-16, or SA-18 SAMs, 1000x7.62mm

Steyr-Daimler-Puch 4K 7FA SPAAG 1/2.20

Country of Origin: Austria

Notes: This is a 4K 7FA KSPz armored personnel carrier with the M2HB turret removed and a twin 20mm antiaircraft turret mounted in the center of the vehicle. The autocannons are of French design. As of 2021, it is still only a possible production vehicle that has not been officially placed into production.

Twilight 2000 Notes: Stocks of this vehicle were drawn from the few prototypes and even fewer production vehicles made before and during the war.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$54,136	D, A	400 kg	13.4 tons	5	16	Radar, Image Intensification	Enclosed

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
140/98	35/25	360	113	Trtd	T3	TF5 TS5 TR5 HF6 HS4 HR4

Fire Control	Stabilization	Armament	Ammunition
+2	Fair	2xGiat M-693 20mm autocannons, MAG (C)	600x20mm, 1600x7.62mm

ZTS Strop

Country of Origin: Czech Republic

Notes: This is a Czech antiaircraft gun/missile system based on the Dana self-propelled artillery gun chassis. It is in fact the Dana with a modified turret to carry twin Russian designed 30mm 2A38M autocannons (the same guns as on the ZSO-30-4) and twin launchers for either SA-7, SA-14, SA-16, or SA-27 missiles. This appears to still be in the testing phase, and may never be adopted due to cost and the existence of the tracked version of the Strop-turreted vehicle.

Twilight 2000 Notes: These systems were only just beginning production before the Twilight War, and few (perhaps 30) were made before the beginning of hostilities.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$241,346	D, A	400 kg	25 tons	3	18	Radar, Passive IR	Enclosed

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
118/46	30/12	690	116	Trtd	W(8)	TF5 TS5 TR5 HF6 HS5 HR4

Fire Control	Stabilization	Armament	Ammunition
+3	Fair	2x30mm autocannons, 2xSA-7, SA-14, SA-16, or SA-27 missile launchers, PKT (C)	2800x30mm, 8xmissile, 1200x7.62mm

BSTT Chimera

Country of Origin: Britain

Seen in: A 1984 proposal by the British School of Tank Technology to prolong the lifetime of the Chieftain MBT. It was a drawing-board proposal that got very close to being built, but in the end only subscale conceptual models were built.

Notes: The Chimera (never type-standardized) was the result of work which would have been done to extend the lifetime of the Chieftain chassis (the Chieftain turret was always the problem, and the BSTT never had access to full-scale turrets). The idea then became a design for a vehicle with a casemated main gun, looking very similar to a German Jagdpanzer Kanone. The result was to be an effective tank destroyer/assault gun, but lighter and cheaper than either a Chieftain or the Challenger 1 that was about to appear in British Army units.

The Chimera was to have the standard L11 120mm rifled gun; because much internal space was freed up by not using a turret, a relatively large amount of ammunition could be carried – both machinegun and main gun rounds. (A version of the Chimera with an XL30 120mm cannon, which is slightly longer and designed to fire more powerful ammo was postulated, which, though it was a low-pressure design, could still fire conventional L11 rounds.) The Chimera has an L7A2 coaxial machinegun and the commander, in a manually-rotating cupola with all-around vision blocks, and also an early form of a OHWS, mounting an M2HB, and fully capable of being aimed, fired, and reloaded from under armor. The commander has an aiming reticle because the L7A2 in front of the cupola can be aimed and fired with the commander under armor, and the main gun can be fired by the commander if necessary. The main gun and coaxial, due to the unturreted design, have a limited traverse of 5 degrees in either direction and to the top and down; the coaxial can manage 10 degrees back and forth and 5 degrees up and down. Like all such designs, further gun movement is done by pivot steering its tracks.

The Chieftain hull is lengthened by one roadwheel, in order to allow the recoil stroke of its main gun in its new, lower position. The two front roadwheels are of steel instead of aluminum, as the design of the Chimera places much more stress on those front roadwheels. The profile is of course low, and the Chimera would have done well in a hull-down position. Armor was also heavily increased over the glacis and hull front, including the use of the then-new Chobham armor. The hull side armor was thick spaced RHA on the top hull side, and somewhat lighter on the lower hull side. This side armor also had a moderate sloping design. The Chimera would have sported a comprehensive fire control system for the time, including a laser rangefinder, ballistic computer, and a night vision suite normally found on the best British tanks. In addition, the Chimera was operated using inertial navigation, with a special mapping unit that contains the maps which would be needed for the most optimistic 48-hour outlook.

The power was provided by a late model L60 multifuel engine, most likely to have been the 12A/N model, giving the Chimera 750 horsepower. An alternate engine mounting was a 1200-horsepower version of the one being fitted into the Challenger 1. There was also talk of using the full-power version of the L60, which would have given the Chimera 1500 horsepower. In addition, the Chimera was to have a 10kW APU for silent watches.

The Chimera was to have a crew of four, driver, commander, gunner, and loader. Their positions are essentially the same as they would have been on the Chieftain – driver on the front right, commander and loader's hatches on the right and left of the rear of the casemate, and the gunner, whose normal station is to the right of the gun, uses the loader's hatch. Though the commander's hatch was equipped with an OHWS, there was a relatively smallish hatch for the commander to squeeze through.

In the end, MoD and Army tank experts examined all of the models, draft drawings, and documents related to the Chimera. Though they determined that the Chimera would be highly effective in a European war, the work on the Chimera came to naught, and they were filed away in one of the BSTT warehouses. Ironically, the whole idea had been thought of in 1972, and one prototype was actually built before the design program was shelved.

Maintenance tools, extra track sections and roadwheels, a first aid kit, and a ration/water heater completed the equipment of the Chimera.

Twilight 2000 Notes: The Chimera and British tankers had sort of a love affair with the Chimera, as they were surprisingly effective at taking out armor and smashing fortifications, while also having an excellent survivability credit. Some Chimera crews took to calling their vehicle the Goliath, or, seeing the resemblance to the Jagdpanzer Kanone, christened it with the name "JagdChieftain."

Vehicle	Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
Chimera (750hp Engine)	\$576,265	D, G, AvG, A	694 kg	57.89 tons	4	43	Passive IR (D), Image Intensification (G, C), Thermal Imaging (G, C)	Shielded
Chimera (1200hp Engine)	\$587,041	D, G, AvG, A	714 kg	57.89 tons	4	43	Passive IR (D), Image Intensification (G, C), Thermal Imaging (G, C)	Shielded
Chimera (1500 hp Engine)	\$588,462	D, G, AvG, A	727 kg	57.89 tons	4	43	Passive IR (D), Image Intensification (G, C), Thermal Imaging (G, C)	Shielded

Vehicle	Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
Chimera (750hp Engine)	115/80	32/22	950	278	Stnd	T6	HF90Cp HS27Sp HR10
Chimera (1200hp Engine)	159/111	44/31	950	446	Stnd	T6	HF90Cp HS27Sp HR10
Chimera (1500 hp Engine)	188/132	52/37	950	558	Stnd	T6	HF90Cp HS27Sp HR10

Vehicle	Fire Control	Stabilization	Armament	Ammunition
Chimera	+3	Basic	120mm L11 Rifled Gun, L7A2, M2HB (OHWS)	70x120mm, 600x.50, 9000x7.62mm

BSTT Excalibur

Notes: Another Cold War prototypical design, the Excalibur predates the Chimera by about ten years. The aim was to produce a tank destroyer which would be amphibious and air-droppable (from the Blackburn B-101 Beverley, a transport of the time a little larger than the C-130). and offer as low a profile as possible. The vehicle was also to have excellent agility, mount a weapon capable of destroying any Soviet tank of the period (early 1960s). It was also expected to be able to mass in formations to plug holes in the mass of tanks that would be on the East/West German border.

The BSTT decided to go with an unusual configuration – a casemated gun, but with the gun in the front of the hull in a “semi-turret”, able to traverse up to 45 degrees in either direction, so that the Excalibur was less dependent on track pivoting to aim its main gun or coaxial machinegun. The gun also sat higher in the casemate than most casemated designs, allowing it a little better of a hull-down position. The gun was a 105mm low-pressure gun that, while it didn’t function so well with the sabotated penetrators which were new issue at the time, but armed with HEAT, HESH, or AP could put up a credible attack against the Soviet tanks of the 1960s. Unfortunately, the low-pressure gun also meant less range than the (also then-new) 105mm L7-type gun. The main gun was also short-barreled, to fit inside aircraft. The result was a gun, though seemingly adequate, was little more effective than an M40 106mm recoilless rifle. The gun was also not stabilized and getting a hit on the move would be largely a matter of luck. In addition to the main gun, the Excalibur was also meant to be able to mount eight Swingfire missiles. These were mounted on four staggered boxes on either side of the vehicle. (The gun was to be made specifically for the Excalibur, and I have given it a fictional designation below. The gun I used was modified from the French Modele F-1.)

To further lighten the Excalibur, the armor was primarily composed of aluminum alloy armor, with a thin steel backing (as Kevlar was not in military use at the time, the steel layer was supposed to be an antispalling layer). The steel backing plate was only 5 millimeters in thickness, and the armor was otherwise not much to write home about. The glacis and side armor was spaced in addition with simple air spaces in the aluminum armor. The Excalibur was not meant to stop an ATGM or a tank main gun round; the armor was designed to stop 14.5mm rounds from the front, 12.7mm rounds from the sides, and assault rifle rounds from the rear. The glacis is sharply raked, and the sides have a moderate slope.

The commander had, on a pintle mount, an M2HB heavy machinegun. The loader had a hatch on the left superstructure, and the gunner used the loader’s hatch. The driver was on the front left behind the glacis plate. However, the driver doubled up as the gunner, as the Excalibur was meant to fight from prepared firing positions, and a separate gunner and driver would not be needed, and because the commander could also function as a gunner. The crew has a vehicular NBC system, with an external scrubber on the rear face.

Power was to be provided by a Leyland L50 multifuel engine developing 580 horsepower. It was envisioned that the vehicle’s primary fuel would be diesel, with other fuels used if no diesel was available. The engine was coupled to an Allison XTG 411-3 automatic transmission. The Excalibur was amphibious without preparation, propelled in the water by two waterjets. Suspension is by torsion bars.

In the end, the British Army was not interested in a casemated-gun tank destroyer with a limited gun, and they rejected the Excalibur.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$392,628	D, G, AvG, A	533 kg	30 tons	3	21	Passive IR (D, G)	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
139/97	39/27/5	700	172	CiH	T4	TF24Sp TS8Sp HF20Sp HS8Sp HR3*

Fire Control	Stabilization	Armament	Ammunition

+1	None	105mm L8A2 Low-Pressure Gun, 8xSwingfire Missile Launchers, L7A2, M2HB (C)	70x105mm, 600x.50, 9000x7.62mm, 8xSwingfire ATGM
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*The turret is in fact a semi-casemated installation. Hits on the TR are not possible; treat these as misses.

Hagglunds Ikv-93

Country of Origin: Sweden

Notes: The Ikv-93 is a version of the Ikv-91 armed with a 105mm gun, produced only as an experiment to increase the Ikv-91's firepower and allow it to continue on in its role as a tank destroyer. It was decided that a new vehicle was needed instead and the Ikv-93 project shelved. The commander, loader, and gunner exit through hatches in the turret deck, while the driver has a hatch on the deck on the front left side. The commander and gunner have periscopes that are the equivalent of binoculars as well as night vision devices. Like the Ikv-91, the Ikv-93 is designed for operations in northern Sweden, and is sure-footed on difficult terrain. The engine has a preheater to ensure that it starts in cold weather. The commander can control the gun as well as the gunner, but the commander has no access to the fire control computer, and his shots are at +2 at best.

Twilight 2000 Notes: A number of conversions from Ikv-91s were made to the Ikv-93 standard before the Twilight War; some more were made afterwards, and there was even a tiny amount produced as new vehicles. About 50 were available for the Twilight War.

Merc 2000 Notes: The Ikv-93 was never produced in any large numbers.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$193,201	D, A	600 kg	16.2 tons	4	14	Active/Passive IR	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
131/92	31/21/3	400	114	Trtd	T4	TF8 TS7 TR6 HF10 HS6 HR4

Fire Control	Stabilization	Armament	Ammunition
+3	Fair	105mm L-7 gun, Ksp m/39, Ksp m/39 (C)	39x105mm, 4250x7.62mm

Hagglunds Ikv-2000

Country of Origin: Sweden

Notes: This vehicle was never developed beyond several reduced-scale models in real life.

Twilight 2000 Notes: This odd-looking vehicle was designed before the Twilight War to produce a capable tank destroyer that could be used on deep snow and rough terrain of the northern reaches of Sweden and in the mountains. It is based on the chassis of the Bv-206 all-terrain vehicle, much upgraded with armor, night vision, and a 120mm stabilized gun. The gun and crew are carried in the front section, while the ammunition is carried in the rear, connected to the gun by a conduit. This is a very rare vehicle, which began production only in mid-1997.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$297,804	D, A	500 kg	25 tons	3	20	Thermal Imaging, Passive IR	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
156/104	36/26	680	213	CiH	T4	TF19Cp TS12 TR8 HF24Cp HS10Sp HR6

Fire Control	Stabilization	Armament	Ammunition
+3	Fair	120mm Rheinmetal gun, Ksp m/39	36x120mm, 2400x7.62mm

Henschel Marder-105

Country of Origin: Germany

Notes: The Marder-105 is the result of an experimental tank destroyer program of the 1980s. They were never actually produced beyond the prototype stage.

Twilight 2000 Notes: When deliveries of the Vextra 105 from France stopped due to the hostilities between the two countries, the Germans were in need of another light vehicle to take the Vextra 105s place. To that end, they mounted a casemated 105mm gun, mounted in a turret with reasonably heavy armor. These vehicles first went into action against Polish troops in late 1997, and gave a good accounting of themselves. Through a combination of good luck and camouflage, the factory producing these vehicles was not destroyed until nearly New Years of 2000, and thus numbers of this vehicle were surprisingly high, surpassing the numbers of Vextra

105s in German service. They gave a good accounting themselves in combat, especially when fighting from hull down positions.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$342,250	D, A	800 kg	29 tons	3	24	Thermal Imaging, Passive IR	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
133/93	31/23	650	203	CiH	T4	TF11Cp TS7 TR6 HF27 HS12 HR8

Fire Control	Stabilization	Armament	Ammunition
+4	Good	105mm L-7 gun, MG-3	36x105mm, 2400x7.62mm

M113/TS 90

Notes: This is an M113 modification offered as an upgrade to customers around the world, but without success. It was also trialed in the US for use as an infantry support vehicle. It is an M113 (which may be an A1, A2, or A3) fitted out with the TS 90 turret, as found on many French-designed armored vehicles. The turret turns the M113 into a light tank destroyer and support vehicle. In this role, the M113's passenger compartment is taken up with the turret and ammunition, and the rear deck hatches and commander's cupola are removed; the fuel tanks, if the base vehicle is an A1 or A2, are moved to the rear.

The engine of the M113A1 is the General Motors 6V53, which develops 212 horsepower. The steering system used is by differential tillers; the vehicle is steered by pulling on the tillers and braked by pulling them both sharply to the rear and put into parking brake by locking them to the rear. The M113A1 has a crew heater, which actually works quite well. The M113A2 is similar, but uses the updated 6V53T engine with an upgraded transmission that has an additional forward speed. The ground clearance is raised by 25mm, due to a beefed-up and more shock-absorbing suspension. The M113A2 has a rather unreliable and accident-prone pivot steering system; this system is usually disabled to prevent thrown tracks. The smoke-grenade system of the M113A2 is replaced by the smoke grenade launchers mounted on the TS 90 turret.

The M113A3 uses a modification of the 6V53T called the RISE package. This version of the 6V53 develops 275 horsepower. The differential steering controls are replaced by a conventional driving yoke and brake pedal. An improved neutral steering system is fitted, restoring the pivot steer capability. Kevlar anti-spalling liners were fitted to increase protection for the occupants. The M113A3-based version of the TS 90-equipped vehicle is absolutely not amphibious, even with flotation cells.

Vehicle	Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
M113A1/TS 90	\$373,269	D, A	558 kg	13 tons	3	9	Passive IR (D, G), Image Intensification (G)	Shielded
M113A2/TS 90	\$373,269	D, A	603 kg	13.4 tons	3	9	Passive IR (D, G), Image Intensification (G)	Shielded
M113A3/TS 90	\$381,069	D, A	616 kg	14.3 tons	3	9	Thermal Imaging (D), Passive IR (G), Image Intensification (G)	Shielded

Vehicle	Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
M113A1/TS 90	133/93	37/26/4	360	124	Trtd	T2	TF6 TS7 TR6 HF6 HS4 HR4
M113A2/TS 90	131/92	36/25/4	360	124	Trtd	T2	TF6 TS7 TR6 HF6 HS4 HR4
M113A3/TS 90	150/105	43/29	360	136	Trtd	T2	TF6 TS7 TR6 HF6 HS5 HR4

Fire Control	Stabilization	Armament	Ammunition
+1	Fair	90mm CN 90 F2 Gun, MAG, MAG (C)	45x90mm, 2200x7.62mm

Nuffield A39 Tortoise Heavy Assault Tank

Country of Origin: Britain

Seen In: British preparations for the invasion of France in Operation Overlord.

Notes: The Tortoise was essentially an assault gun (though the British designated it a Heavy Assault Tank, it was also known as the Special Vehicle, Assault), conceived of in early 1943 in preparation for the Operation Overlord landings in France. Its job was to destroy heavy fortifications, and especially the Siegfried Line fortifications, which intelligence said was being used by the Nazis (the

intelligence was largely wrong, however). The Tortoise was designed to have a powerful gun (for the time) coupled with heavy frontal armor (again, for the time; the glacis had 228mm of armor, sharply sloped; even the top had 33 millimeters of armor. Only a few prototypes were produced by the end of World War 2, and none took part in any action. It's size, simply, made it almost impossible to deploy with the methods available at the time. After the war, six were produced and sent to the BAOR for field trials, but proved to be too heavy for any sort of agility. Only two Tortoises survive today, one as The Tank Museum in Bovington in the UK; this one is kept in perfect running order, despite being only rarely displayed. The other is in the Kirkcudbright Military Training Area in Scotland, and the MoD has declared it a Site of Scientific Special Interest. This greatly complicates the ongoing effort to bring the Tortoise back to running order, as the vehicle cannot be recovered without the MODs approval, which they never seem to give.

The weight quickly grew to extreme proportions; at 78 tons, it was much heavier than an M1A2 or a Challenger 2. This is despite the fact that it has only a casemated gun, and not a true turret. The armor of the casemate is, in fact continuous with the armor of the vehicle, especially in the front of the vehicle. The gun could be traversed 40 degrees to either side of the front. The main itself was an Ordnance QF 32-pounder (94mm) high-velocity gun, along with two Besa 7.92mm machineguns in ball mounts on the right side of the glacis, and another in a ball mount to the left of the main gun's ball mount

The Tortoise had a large crew – the driver, commander, assistant driver, gunner, machinegunner and two loaders. The driver and the assistant driver operated the two glacis-mounted machineguns, while the machinegunner operated the casemate's machinegun. The long main gun length meant that a travel lock was necessary, and this was electrically operated. The Tortoise also had three clusters of 76mm grenades, a cluster of three on each side of the hull, and a three-round cluster was to the right of the casemate's machinegun ball mount. A third weapon was a 2-Inch smoke and ILLUM launching mortar, mounted in the rear of the casemate. Atop the casemate were two hatches for the commander and one for everyone else. The Tortoise also had an azimuth indicator, another advanced feature for the time.

However, the Tortoise was not blessed with agility, being equipped with an engine of only 600 horsepower. Though weak for the Tortoise's weight, it one of the most powerful engines available for armored vehicles of the time, and was based on the Spitfire's Merlin engine. The Tortoise was difficult to deploy, even disassembled, and could not cross most European bridges, nor could it cross a Bailey Bridge. Also not helping were the tracks, as they were an astounding 90 centimeters wide.

The Tortoise was fitted with experimental night vision gear (advanced for the time).

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$396,738	G, A	800 kg	78 tons	7	40	Active IR (G)	Enclosed

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
73/51	20/14	720	266	Std	T6	HF116 HS44 HR15

Fire Control	Stabilization	Armament	Ammunition
+1	None	Ordnance QF 32-Pounder (94mm) Gun, 3xBesa Machineguns	60x94mm, 4500x7.92mm

Bernardini MB-3 Tamoyo

Notes: The MB-3 Tamoyo (sometimes erroneously written as "MBT-30") was an interesting idea to turn a light tank into a main battle tank. Based on Brazil's modernization of their M41 Walker Bulldogs to the M41C Caxias standard, Bernardini felt that they could take the M41 much further than the upgrades already applied to Brazilian M41s. This program was a company project, and they hoped to get Brazilian Army sales as well as upgrade sales to other countries using the M41. The project was originally designated X-30, and design work began in 1978. Original prototypes had only the 76mm gun of the Walker Bulldog, but this later upgunned to a 90mm gun, and the last prototype was armed with a 105mm M68 rifled gun. The result was a tank that, while in most cases under-gunned, barely resembled its M41 ancestors. The Brazilian Army was impressed with the MB-3, but was more impressed with Engesa's EE-T1 Osorio, and a lot of M60A3 TTSs and Leopard 1A5s had recently become available for RL dirt-cheap prices. The Tamoyo simply didn't stand a chance on the international marketplace. A little-known fact is that the Tamoyo had modified M41 treads and modified roadwheels, allowing them to use normal Brazilian roads instead of being restricted to off-road/trail use.

The hull looks like – well, it looks like a Leopard 1 chassis, and the fact that the chassis was extended by one roadwheel and that the Tamoyo used Leopard 1-type track skirts just helped this resemblance along. The hull of the Tamoyo essentially looked almost nothing like that of the M41. Internally, things had changed mechanically as well, such as the aforementioned lengthened hull with roadwheels, a much more powerful 500 horsepower Saab-Scania DSI-14 turbocharged diesel (with a 730-horsepower Detroit Diesel 8V-92TA also tested for possible upgrade packages), an automatic transmission (either a GDLS HMPT-500 or an Allison CD-500-3), and conventional driver controls. Armor was not only strengthened, it was improved by the use of spaced armor, a variant of Chobham armor, and better slopes to its armor package. The suspension has M41-type torsion bars, but has 12 instead of the normal 10 due to the greater length and addition of roadwheels. The first, second, and sixth roadwheels on each side also have shock absorbers. A pivot steer capability was added.

The turret was of a totally different design than the M41, both outside and inside. Bernardini offered four choices of main gun: the M41's original M32 rifled 76mm (though newly made, it is the same design); Bernardini's M32 BR3 76/40 76mm rifled short gun; Bernardini's rifled 90mm gun, and the M68 version of the British L7A3 rifled 105mm gun. Fire control stabilizes the main guns in two planes, while a ballistic computer and laser rangefinder further increased gun accuracy. The turret has stabilized day/night sights for both the commander and gunner, allowing a hunter/killer capability. In addition, the Tamoyo has an FN MAG coaxial and a commander's cupola with a pintle-mounted M2HB machinegun. The commander and loader have all-around vision blocks, while the driver can see through vision blocks to the front 160 degrees. The driver also has a night channel for his central vision block.

Other available features included NBC Overpressure (though a vehicular NBC system was normally the standard protection), a CO2 fire/explosion detection and extinguishing system, and a sealed ammunition compartment in the turret bustle, with blow-off panels.

My personal opinion is that the Tamoyo would have made a good fire support vehicle for infantry units, even if it could not fill the MBT role.

Only one of the Initial Prototype was built, as well as one of the Tamoyo I. Eight Tamoyo IIs were built, and again, only one Tamoyo IV was built.

Twilight 2000 Notes: Seven Tamoyos were kept by the Brazilian Army at several museums in good running order, and these made it to the South American battlefields of the Twilight War; their fates are unknown after this point, except for one restored Tamoyo III, which was put on display in Bogota starting in 2011.

Vehicle	Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
Initial Prototype	\$336,838	D, A	641 kg	30 tons	4	17	Passive IR (D), Image Intensification (G, C), Thermal Imaging (G, C)	Shielded
Tamoyo I	\$346,779	D, A	636 kg	29.97 tons	4	17	Passive IR (D), Image Intensification (G, C), Thermal Imaging (G, C)	Shielded
Tamoyo II	\$389,705	D, A	641 kg	30.05 tons	4	17	Passive IR (D), Image Intensification (G, C), Thermal Imaging (G, C)	Shielded
Tamoyo III	\$391,143	D, A	652 kg	30.05 tons	4	17	Passive IR (D), Image Intensification (G, C), Thermal Imaging (G, C)	Shielded
Tamoyo IV	\$723,070	D, A	658 kg	30.25 tons	4	17	Passive IR (D), Image Intensification (G, C), Thermal Imaging (G, C)	Shielded

Vehicle	Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
Initial Prototype	136/95	38/26	700	185	Trtd	T5	TF80Cp TS26Sp TR17 HF79Cp HS19Sp HR12
Tamoyo I	136/95	38/26	700	185	Trtd	T5	TF80Cp TS26Sp TR17 HF79Cp HS19Sp HR12
Tamoyo II	136/95	38/26	700	185	Trtd	T5	TF80Cp TS26Sp TR17 HF79Cp HS19Sp HR12
Tamoyo III	183/128	51/36	700	280	Trtd	T5	TF80Cp TS26Sp TR17 HF79Cp HS19Sp

Tamoyo IV	182/127	51/35	700	280	Trtd	T5	TF80Cp TS26Sp TR17 HF79Cp HS19Sp HR12
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Vehicle	Fire Control	Stabilization	Armament	Ammunition
Initial	+2	Good	76mm M32 76mm Gun, MAG, M2HB (C)	68x76mm, 6000x7.62mm, 600x.50
Prototype Tamoyo I	+3	Good	76mm M32 BR3 76/40 Short Gun, MAG, M2HB(C)	68x76mm, 6000x7.62mm, 600x.50
Tamoyo II/III	+3	Good	90mm Bernardini L/40 Gun, MAG, M2HB (C)	57x90mm, 6000x7.62mm, 600x.50
Tamoyo IV	+3	Good	105mm M68 Gun, MAG, M2HB (C)	48x105mm, 6000x7.62mm, 600x.50

Bofors Strv-2000

Country of Origin: Sweden

Notes: This vehicle does not exist in real life, beyond a wooden full-sized model.

Twilight 2000 Notes: Designed shortly before the war, the Strv-2000 was put into production during the Twilight War since the supply of Leopard 2A5s stopped when Germany decided it needed them more than the money from exports. The vehicle features state of the art night vision, full gun stabilization and fire control, a large caliber gun, and a coaxial cannon for engaging soft targets and lighter AFVs. Normally, only APFSDS or APFSDS-T ammunition was carried for the main gun, since the type of targets normally engaged by HEAT, HE, or WP ammunition would be engaged by the coaxial cannon or machinegun. The Strv-2000 was perhaps the most heavily armed and armored ground vehicle in the world in the Twilight War.

Merc 2000 Notes: This vehicle does not exist in the Merc 2000 timeline.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$847,040	D, A	700 kg	56.5 tons	4	18	2 nd Generation Thermal Imaging, Passive IR, Image Intensification	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
171/119	35/25	1200	907	Trtd	T6	TF194Cp TS42Sp TR22 HF243Cp HS30Sp HR14

Fire Control	Stabilization	Armament	Ammunition
+5	Good	140mm gun, Bofors L/70, Ksp-39, MAG (C)	38x140mm, 180x40mm, 2400x7.62mm

GDLS M1A3 Abrams IV

Country of Origin: United States

Notes: This vehicle grew out of General Dynamics' experimentation with the FMBT (Future Main Battle Tank) concepts, but was never built. I've heard some rumors that there is an upgrade to the M1A2 that will be designated the M1A3, but this vehicle is not it.

Twilight 2000 Notes: Also known as the "Giraffe," the Abrams IV is a standard M1A2 chassis with a greatly modified interior and an unmanned casemate turret mounting with a standard 120mm gun or an L/55 version of the 120mm gun. In either case, the M1A3 is equipped with all the improvements of the M1A2SEP, as well as a more powerful engine. This, combined with its lighter weight, give the M1A3 a leap in mobility over other M1A2-based designs. Always rare in the Twilight War, with only about 150 of them being built, most of the Giraffes were deployed to divisional cavalry squadrons in the Middle East, though some 30 late production Giraffes were issued to the TXNG's 49th Armored Division, and about 10 showed up in USMC service in Europe (though it is a mystery how the Marines got them, since they were never officially issued to Marine units). The driver's hatch is moved to the front left deck, and the commander's hatch to the front left deck. The gunner uses the commander's hatch.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$758,709	D, G, AvG, A	700 kg	59 tons	3	19	Thermal Imaging, Passive IR	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
165/116	35/25	1907	1092	CIH	T6	TF132Cp TS43 TR35 HF264Cp HS38Sp HR28

Fire Control	Stabilization	Armament	Ammunition
+5	Good	120mm Rheinmetall or L/55 Gun, MAG, M2HB (C)	40x120mm, 12400x7.62mm, 1000x.50

GDLS M1A4 Abrams V

Country of Origin: United States

Notes: This vehicle does not exist in real life; in fact, I made it up myself!

Twilight 2000 Notes: This vehicle is a progressive development of the M1A2SEP, mounting a heavier caliber gun, coaxial cannon

in addition to the machinegun for less armored targets, and a commander's weapon mount that can use a variety of weapons. The vehicle is equipped with 2nd generation thermal imaging, a VIDS system, and an IR jammer. Most of these vehicles never made outside of the continental US, though it is estimated that about 10 were deployed to Europe, and another 20 to the Middle East. Most of these vehicles were used against the Mexicans (where most of the combat against them resulted in lopsided slaughters in favor of the US side), and to Alaska and Canada to combat the Russian invasion.

Merc 2000 Notes: This vehicle does not exist in the Merc 2000 timeline.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$979,831	D, G, AvG, A	500 kg	62.4 tons	4	19	Passive IR, 2 nd Generation Thermal Imaging	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
159/112	35/25	1907	1099	Trtd	T6	TF211Cp TS53Sp TR45 HF264Cp HS38Sp HR28

Fire Control	Stabilization	Armament	Ammunition
+5	Good	140mm gun, 30mm Bushmaster II, MAG, MAG (L), M2HB (C) or BRG-15 (C) or M214 (C)	69x140mm NATO, 500x30mm, 7250x7.62mm, 1100x.50

General Dynamics M60 Modernization Package

Country of Origin: United States

Notes: This vehicle does not exist beyond some demonstrator models, though General Dynamics still offers the upgrade package.

Twilight 2000 Notes: General Dynamics produced a modernization upgrade package in the years before the Twilight War, and with storm clouds on the horizon, many countries that already used the M60A3 purchased the package and had their vehicles fitted with it. The upgrade package consists of new armor, a more powerful engine, better transmission, and improved fire control system with ballistic computer, gun stabilization, and safer ammunition storage. Among the customers were certain units of the US Army National Guard, some of who were still using M60A3s in the front line role; they called the modified M60A3 the M60A3E1. Cost of the upgrade kit is only one quarter the basic cost of the complete vehicle. Ammunition storage is similar to the M1, in that ammunition hits in the turret do not destroy the vehicle; instead, all the ammunition is destroyed and 50 concussion hits are applied to the crew. The Modernized M60A2 has lugs for reactive armor (HF, TF, TS).

Merc 2000 Notes: This vehicle does not exist.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$554,948	D, A	725 kg	56.3 tons	4	18	Passive IR, Thermal Imaging, WL/IR Searchlight	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
128/90	30/21	1420	352	Trtd	T6	TF74Sp TS25Sp TR20 HF92Sp HS18Sp HR12

Fire Control	Stabilization	Armament	Ammunition
+4	Good	105mm M68 gun, MAG, MAG (L), M2HB (C)	35x140mm, 1400x30mm, 5700x7.62N, 1000x.50BMG or 850x15.2BRG or 2300x5.56N

GIAT AMX-40

Country of Origin: France

Notes: The AMX-40 was designed in the early 1980s to be a follow-on to the AMX-30 and AMX-32, with the export market in mind. As such, it has many common features with AMX-30 and AMX-32. Unfortunately, more and more tanks that could out-do the AMX-40 were becoming available on the world market, as a (real-world) cost comparable to the AMX-40. This disparity worsened as time went by; the AMX-40 found no buyers, and by 1990, GIAT no longer offered the AMX-40.

The AMX-40 has a conventional layout, basically identical to the AMX-32. The turret is large and angular, made for the use of composite and ceramic sandwich armors. The glacis is also designed to use composite armor, and the hull sides have spaced armor skirts. Armament layout is also similar to the AMX-32, with the exception of the use of a 120mm French-designed gun instead of the AMX-32's 105mm main gun. The 20mm coaxial autocannon is retained, as is the commander's cupola with a 7.62mm machinegun. The commander's machinegun is able to be aimed and fired (but not reloaded) from inside a closed cupola. The turret has a large bustle containing 15 rounds of main gun ammunition as well as machinegun and autocannon ammunition. The coaxial autocannon has independent elevation from the main gun. Fire control is essentially the same as the AMX-32, with an advanced (for the time) ballistic computer, laser rangefinder, monitors for the gunner and commander, and a CITS for the commander with his own vision devices and laser rangefinder. An NBC overpressure system is fitted, along with an automatic fire detection and extinguishing system. On each side of the turret is a cluster of six smoke grenade launchers.

The engine of the AMX-40 was a Poyand V12X supercharged 1100-horsepower diesel, with an upgraded transmission to match. (The best feature of the AMX-40 was its speed and agility.) The suspension is also beefed up over that of the AMX-32, to handle rough terrain as well as aid in stabilizing the main gun for fire on the move and fighting crew fatigue.

Twilight 2000 Notes: The AMX-40 was in fact mass-produced in the Twilight 2000 timeline – not just for export (it formed part of Spain's tank force), but to equip the French Foreign Legion as their primary main battle tank. They were sent to the Middle East with the Foreign Legion, with the Leclercs being retained for European use.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$655,274	D, A	750 kg	43.7 tons	4	24	Passive IR (D), Image Intensification (G, C), Thermal Imaging (G, C)	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
156/109	36/29	1100	546	Trtd	T6	TF102Cp TS42Sp TR29 HF128Cp HS30Sp HR18

Fire Control	Stabilization	Armament	Ammunition
+4	Good	120mm GIAT gun, 20mm GIAT 20mm M621 autocannon, AAT-F1 (C)	38x120mm, 578x20mm, 2170x7.62mm

KADDB Tariq 2

Country of Origin: Jordan

Notes: This is a Tariq retrofitted with a kit provided by the US firm Cadillac Gage. The kit converts the Tariq into a low-profile tank with a casemated main gun. The gun has an autoloader and the number of crew is reduced. The crew rides in the hull. The gun is a new Rheinmetall gun. The vehicle is much lighter, has a lower profile, and better performance. The lugs for reactive armor on the hull are retained (HF, HS). As of 2006, this is still an experimental project, hampered by a lack of funding and any real need for the tank by the Jordanian armed forces.

Twilight 2000 Notes: About 75 of these modifications were carried out before the Twilight War.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$411,724	D, A	550 kg	48 tons	3	17	Passive IR	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
92/64	21/16	1037	207	CiH	T6	TF45 TS34 TR22 HF60 HS13 HR8

Fire Control	Stabilization	Armament	Ammunition
+3	Good	105mm M68 Gun, MAG	64x105mm, 4750x7.62mm

Krauss-Maffei Leopard 3

Country of Origin: Germany

Notes: This vehicle does not exist in real life; it is a product of the imagination of the designers at GDW.

Twilight 2000 Story: This version of the Leopard 2 was developed at the same time as a number of experimentations with casemated turrets; the same experiments in NATO led to vehicles such as the M1 Hawk and M1A3 Abrams IV "Giraffe," and similar experiments in Russia led to the T-94, T-95, and the Kliver turret. The Leopard 3's built (about 65 in all) entered service with the 1st and 10th Panzer Divisions as early as 1993, at first with scout elements, then in regular tank battalions. They acquitted themselves well in battle, especially when fighting from hull-down positions, but their lack of numbers meant that any losses hurt, and by 2000, they were a bit scarce. The Leopard 3 has three hatches for the driver, gunner, and commander, all on the front deck.

Merc 2000 Story: This vehicle does not exist in the Merc 2000 timeline.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$675,028	D, G, A	500 kg	51.6 tons	3	17	Passive IR, Thermal Imaging	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
181/127	40/25	1200	720	CiH	T6	TF128Cp TS52 TR32 HF213Cp HS26Cp HR16

Fire Control	Stabilization	Armament	Ammunition
+5	Good	120mm Rheinmetall Gun, MG-3 (C)	38x120mm, 4750x7.62mm

LIW/Reunart Tank Technology Demonstrator

Country of Origin: South Africa

Notes: The Tank Technology Demonstrator is basically a tank awaiting funds. Most of the design work has been completed, but SANDF simply doesn't have the money to produce or acquire any new tanks.

Twilight 2000 Notes: Though this South African tank entered series production as the Twilight War picked up, the experimental

name stuck (though normally abbreviated to simply the "Tech;" it never received any official designation from the SANDF). The TTD was meant to provide a match for the T-72 tanks that more and more of its neighbors were receiving from the Russians. To this end, an advanced vehicle was designed incorporating composite armor and advanced targeting systems, as well as the ability to use reactive armor. Three versions were designed (in increasing rarity), one armed with a 105mm gun, a 120mm gun, and a 140mm gun. The 140mm-armed version is very rare, perhaps 5 of the total being built with this gun. The TTD features a laser warning system that automatically launches smoke grenades in the path of an incoming laser. Ammunition storage areas feature blow-off panels that protect the crew from an ammunition explosion, and if an ammunition explosion occurs, the vehicle is not destroyed and the crew is not killed, but each member of the crew receives 50 concussion hits.

Merc 2000 Notes: This program has been shelved indefinitely; the South Africans have instead acquired Sabra tanks from Israel, along with a few Merkava Mk 1s.

Vehicle	Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
TTD/105	\$877,919	D, A	700 kg	56.5 tons	4	20	Passive IR, Thermal Imaging, Image Intensification	Shielded
TTD/120	\$879,855	D, A	700 kg	58.3 tons	4	20	Passive IR, Thermal Imaging, Image Intensification	Shielded
TTD/140	\$935,218	D, A	700 kg	60.6 tons	4	21	Passive IR, Thermal Imaging, Image Intensification	Shielded

Vehicle	Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
TTD/105	143/100	30/20	1600	741	Trtd	T6	TF115Cp TS34Sp TR21 HF144Cp HS24Sp HR13
TTD/120	141/99	30/20	1600	741	Trtd	T6	TF115Cp TS34Sp TR21 HF144Cp HS24Sp HR13
TTD/140	139/98	30/20	1600	741	Trtd	T6	TF115Cp TS34Sp TR21 HF144Cp HS24Sp HR13

Vehicle	Fire Control	Stabilization	Armament	Ammunition
TTD/105	+4	Good	105mm Gun, MG-4, MG-4 (C)	54x105mm, 2000x7.62mm
TTD/120	+4	Good	120mm Gun, MG-4, MG-4 (C)	48x120mm, 2000x7.62mm
TTD/140	+4	Good	140mm Gun, MG-4, MG-4 (C)	40x140mm, 2000x7.62mm

Merkava Mk 5

Country of Origin: Israel

Notes: I have used this designation for an experimental idea for an upgunned Merkava Mk 3. As far as I know, no prototypes of this form of the Merkava have actually been built, but considerable computer studies have been done.

Twilight 2000 Notes: This is a greatly-upgraded Mk 3, with additional armor, a more powerful engine, and larger hull. The turret controls are all-electrical. The loader's hatch in the turret is eliminated, leaving only the commander's hatch. The main gun is an L/55 model similar to those being fielded for the Leopard 2A6. The fire control system is the most advanced available and is capable of tracking even slow-moving aircraft and helicopters. The rear of the hull has a camera to assist the driver in backing the tank. Belly armor is increased along with the rest of the armor. The Merkava Mk 4 is equipped with a countermeasure system similar to that of the Shtora-1 of Russian tanks; when an incoming round is detected, a small missile is fired into the path of the incoming round to intercept it. This system has 10 such missiles, and they are 25% likely to intercept an incoming main gun round, or 75% likely to intercept an incoming ATGM or rocket launcher round. The ability to carry passengers is retained; up to 8 may be carried by removing 9 rounds of main gun ammunition per passenger.

Merc 2000 Notes: Budget problems have delayed deployment until at least 2007.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$988,582	D, A	700 kg	65 tons	4	22	Thermal Imaging, Image Intensification	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
184/129	40/30	1400	584	Trtd	T6	TF190Cp TS42Sp TR27 HF237Cp HS30Sp HR17

Fire Control	Stabilization	Armament	Ammunition
+5	Good	140mm gun, MAG, MAG (C), MAG (L), 60mm C-06 Mortar	84x120mm, 10000x7.62mm, 30x60mm

Omsk Transmash Obyekt 640 Chyorny Oryol (Black Eagle)

Country of Origin: Russia

Notes: Obyekt 640, more commonly known by the Western translation of its name, "Black Eagle," is a tank with a little mystery behind it. It could be an advanced prototype, a testbed for other tank technologies, a one-time replacement for the T-80 and T-90, or a tank design that failed for technological or budget problems. It does not, however, appear to be an active design, or something that is going to go into production at this time or in the near future, and its design bureau, Omsk Transmash, declared bankruptcy in 2002 and still in bankruptcy management. The designs and the prototypes have been sold to KBTM, who build the T-90 series and are developing a new tank for the future.

The roots of the Black Eagle go back to the late 1980s as a stretched version of the T-80U with a new turret. Supposedly, the design got even more impetus after Desert Storm in 1991, when the Russians were shocked by the effectiveness of the US Abrams and British Challenger tanks. A supposed prototype was demonstrated at the VTTV Arms Exposition in Omsk in 1997; however the prototype made only one pass for the viewers, and this was a long way from the reviewing stands. The turret was covered by several layers of camouflage netting that effectively obscured the details of the turret and the Black Eagle was moving fast. The prototype looked like a standard T-80-type hull with a new turret that had a large bustle and a large gun that some reviewers estimated might be as large as 152mm in caliber. However, this vehicle was instead a T-80 hull with a crude mocked-up turret, one that could traverse the "turret" about 45 degrees in one direction or the other; the "gun" was likewise a fake.

Another prototype was shown at an arms exposition in Siberia (one that had limited attendance) in mid-1999. This one did indeed have a stretched T-80U hull with seven roadwheels instead of six, but the turret was still covered with camouflage netting (not quite as thick this time, but it was obscuration enough). The gun was also 125mm, but the barrel was longer than the standard 2A46 gun and had a thick thermal sleeve. A few other views here and there (including some with no netting on the turret) since then have revealed the shape of the turret; it has heavy, sloped frontal armor and a large turret bustle, and is mostly squared-off in shape instead of being the dome shape that is traditional for Soviet and Russian-built tanks. The commander's and loader's hatches are widely-spaced, to allow room for the autoloader and the bustle-carried ammunition. Some technical details are also now known, enough to stat it for *Twilight 2000* game use.

The Black Eagle is a radical departure from traditional Russian/Soviet tank design; notes about the shape of the turret are in the preceding paragraph. The turret shape also allows for the mounting of main guns of up to 152mm without major modifications to the turret or autoloader. The hull lengthening appear to have been done partially to allow for more glacis sloping and armor, and to allow the driver's position to be moved back so the hatch and his vision blocks are not part of the glacis. The engine power has been described in horsepower from 1250-1800 horsepower; most seem to settle on 1400 or 1500 horsepower, and I have used 1500 horsepower for the stats below. The engine has been described as either diesel or multi-fuel; I have used diesel below, as the Russians do not seem to use many multi-fuel engines in practice. The transmission is said to be fully automatic, and the engine and transmission have electronic controls and "helpers" like many modern Western designs. An APU is sometimes said to be a part of the design, with 1-5kW in range; I have used 2kW below. The elongated hull may also allow for additional fuel capacity over the T-80 series; the Black Eagle has not yet been seen with extra fuel tanks at the rear.

Armor protection is heavy, especially in the frontal arc; composite armor in the frontal arc is certain, with a spaced laminate armor sandwich-type armor on the sides. There are lugs for ERA on the turret front, turret sides, hull front, and hull sides; this ERA is normally the new Kaktus 3rd-generation version. Another feature is the Arena active protection system. The Black Eagle has thick side skirts which are probably also of spaced laminate armor. Each crewmember is in his own compartment in the tank and separated by bulkheads from each other, limited collateral casualties.

At present, the main armament of the newest prototypes of the Black eagle appears to be a version of the standard 2A46M with a longer barrel length and a thermal sleeve (I have used L/60 for the stats below). Other gun sizes have been discussed with respect to the Black Eagle, including 135mm and 152mm guns; I have included such armament below as a point of conjecture. The Black Eagle has not been seen with a commander's machinegun as of yet, but it is probable that one would be provided that could be aimed and fired (and possibly reloaded) from within the turret. The coaxial is likely to be the standard Russian PKT machinegun. Smoke grenade launchers have also not yet been seen on the Black Eagle, but it is likely that some would be mounted; I have allowed in the stats a cluster of five on each side. The main gun is fed by an autoloader like the typical modern Russian tank, but it is a very different system. Currently, Russian autoloaders use a carousel system, with the ammunition in the floor of the turret; the Black Eagle uses an autoloader in the center of the turret in a tunnel, fed by ammunition in the large bustle, and controlled by the gunner through the use of a computer to select the ammunition type, fuzing, and charges. The bustle itself holds 30 rounds of 125mm ammunition (or 28 135mm rounds, or 25 152mm rounds) and has blow-out panels *a la* the M1 Abrams to protect the crew from an ammunition explosion. The remaining rounds and any ATGM rounds are carried in armored bins in the floor of the turret and in the hull. The new autoloader and ammunition arrangement means that the overall height of the Black Eagle could be reduced by almost half a meter.

Like many modern tanks, the Black Eagle is to be fitted with a Battlefield Management System, which plots positions of friendly and enemy units, logistics points, and sends and receives new orders and information on a continuous basis. A laser/IR/radar warning system is also provided.

The Black Eagle may never materialize as a production vehicle, but it does show that at least some designers are thinking about more modern designs. Many of the design elements of the Black Eagle were incorporated into the later T-14 Armata.

Twilight 2000 Notes: The Black Eagle, was produced in small numbers before and during the Twilight War; however, these numbers were so small that a nickname among NATO troops for the Black Eagle is the "Ghost Tank."

Vehicle	Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
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Black Eagle 1	\$955,846	D, A	500 kg	50.5 tons	3	24	Thermal Imaging (G, C), Image Intensification (G, C), Passive IR (D)	Shielded
Black Eagle 2	\$944,020	D, A	500 kg	50.3 tons	3	24	Thermal Imaging (G, C), Image Intensification (G, C), Passive IR (D)	Shielded
Black Eagle 3	\$956,542	D, A	500 kg	50.5 tons	3	24	Thermal Imaging (G, C), Image Intensification (G, C), Passive IR (D)	Shielded

Vehicle	Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
Black Eagle 1/3	168/118	33/27	1300	691	Trtd	T6	TF171Cp TS42Sp TR32 HF214Cp HS30Sp HR20
Black Eagle 2	169/119	33/27	1300	688	Trtd	T6	TF171Cp TS42Sp TR32 HF214Cp HS30Sp HR20

Vehicle	Fire Control	Stabilization	Armament	Ammunition
Black Eagle 1	+5	Good	125mm L/60gun, PKT, NSVT (C)	43x125mm, 5xATGM, 3750x7.62mm, 1000x12.7mm
Black Eagle 2	+5	Good	135mm gun, PKT, NSVT (C)	40x135mm, 3750x7.62mm, 1000x12.7mm
Black Eagle 3	+5	Good	152mm gun, PKT, NSVT (C)	35x152mm, 3750x7.62mm, 1000x12.7mm

T-72/T-21 Shilden Leclerc

Country of Origin: France (Sort Of)

Notes: This vehicle is based on a fictional tank found on Deviant Art. It does not, and probably never will, exist in real life.

Twilight 2000 v2.2 Notes: This odd combination of a T-72 Shilden hull and an AM56 Leclerc turret was the result of the philosophy throughout the world in the late Twilight War of never wasting anything. The T-72 was dealt a near-simultaneous hit on the left side by an APILAS rocket launcher and an antitank mine on the right⁶, and the result was a T-72 that had shed both its tracks and a few roadwheels to boot, but the worst hit was a semi-penetrating hit to the turret to the T-72's turret by a glancing hit by a HESH round near the top curve of the turret. The Leclerc had been sitting around about the same, unusable due to thorough toasting of its hull, though the turret and most of the turret basket retained its integrity. The Shilden was wheeled/dragged to the base; a French tank mechanic then had the idea that the tank could be rehabilitated, and after through measurements of the turret ring of the Shilden and the turret requirements of the Leclerc, got permission from his commander to mate the Leclerc's T-21 turret with the repaired tracks and roadwheels on the T-72 hull. The mechanics christened it the Shilden Leclerc, and it served for at least four years in the Middle East alongside other armored vehicles, after which there no more mentions of the Shilden Leclerc in the logs of the unit, except for sporadic mentions for the next three years.

The hull is a standard T-72B's hull, with little trace of its incapacitation; the turret is also virtually identical to the Leclerc Block I turret. his makes an odd enough-looking combination all by itself, but the Shilden Leclerc has a bank of seven Lyran-71 multipurpose grenade launchers on either side of the gun. Inside, however, extensive modifications have been made, including French radios, 40 120mm rounds available to the Leclerc autoloader, and 22 rounds stored in the former T-72 autoloader, with the carousel now used as storage for ammunition. The turret further has CITS, but otherwise good, but basic, French day/night/telescopic vision devices, while the driver has a Russian day/night vision block. The commander's position is equipped with an AAT-F1 machinegun on a pintle, The AAT-F1 may be aimed, fired, and loaded from within the vehicle if necessary. The gun is stabilized in two planes by a combination of gyroscope and ballistic computer, though Fire Control is not as good as either the Shilden or Leclerc. The commander also has a panel showing the state of the entire tank (though it cannot access the rounds in the 7-72B carousel or transmission). The Leclerc has an inertial navigation system that keeps constant track of where the Leclerc is in relation to the start point inputted into the system. The inertial navigation system is also tied to a computer that keeps track of vital friendly units, such as supply, replenishment, and command units, as well as the vehicle state. (Note that while the Shilden Leclerc has many of the features of a BMS, it is not an actual BMS. However, the commander, gunner, and driver have LCD panels to show them the vehicle state, and keep the driver on-course.

The armor of the Leclerc's T-21 turret is modular; as better or new types of armor are developed, the faces of the turret, glacis, and hull sides can be easily removed and replaced with new developments in armor. The Leclerc brings its 23kW TM307B gas turbine APU to reduce fuel consumption when the Leclerc is on watch operations or simply staying still. The tank has NBC Overpressure and a vehicular NBC backup. On the turret wall in the back is fitted a 30-liter drinking water tank; another 10-liter tank is in the driver's compartment.

The Shilden Leclerc brings a fire /explosion automatic detection, one for the engine and transmission compartment and one for the rest of the vehicle. The hull has the armor rating of the standard T-72, and retains lugs for ERA on the HF (including halfway up the glacis and hull sides. T-72 extra fuel tanks are installed at the rear of the hull. The T-72AB hull has special screen for the engine that greatly decrease the possibility that Molotov cocktails or ruptured external fuel tanks will pour fuel into the engine compartment.

The engine is that of the Shilden hull, a V-84-1 840-horsepower turbocharged engine. The V-84-1 is a multifuel engine; it can use diesel (meant to be the primary fuel), gasoline, jet fuel, benzene, kerosene, and even liquid rocket fuel which does not require

refrigeration. This means that the engine compartment is larger than that of earlier T-72s. If using diesel, it can inject this fuel into its exhaust to produce a thick, oily smokescreen. The front of the T-72B is fitted with mounting equipment to allow the use of the KMT-6 mine plow, and there is an unditching beam at the rear. The cumbersome tiller steering system has been replaced with a steering yoke, brake pedal, and gas pedal.

The GIAT T-21 120mm smoothbore gun cannot fire the original 125mm ammunition of a whole Shilden. It can use any Rheinmetall NATO/US/Western/Chinese rounds, including the guided LAHAT ATGM, though its gun barrel. The coaxial machinegun is an M2HB, which not only has antipersonnel value, but can be used as a backup ranging machinegun. The loader's machinegun is an AAT-F1. An air conditioner has been fitted, but this does not have NBC filters.

This singular Shilden Leclers has a wear value of 4 for most turret components and 5 for the hull.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$1,662,078	D, A (And Others)	450 kg	46 tons	3	28	Passive IR (D), Image Intensification (G, C), Thermal Imaging (G, C)	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor		
120/98	39/27	1100+380	298	Trtd	T6	TF136Cp	TS39	TR30 HF148Cp HS24Sp HR12**

Fire Control	Stabilization	Armament			Ammunition		
+4	Good	120mm Gun, PKT, NSVT (C)			40x120mm, 3500x7.62mm, 500x12.7mm		

TM810

Country of Origin: Romania

Notes: This vehicle does not exist in real life; it is a product of the *Twilight 2000* designers at GDW. (It is seen in *Twilight 2000* publications as the "M81," but I felt that the designation "TM810" is closer to a real Romanian designation.)

Twilight 2000 Notes: Originally an experimental modification of the TM800, the TM810 was placed into production in earnest after Romania switched sides to NATO, and needed a tank to combat some of the more advanced Russian and Eastern European designs. It is essentially a TM800 chassis topped with a larger turret to house a 120mm Rheinmetall gun. Though primarily issued to Romanian troops later in the war, about three dozen of these tanks were acquired by US tankers operating in Yugoslavia and southern Romania, and the Americans using the TM810 were generally pleased with its performance, though not as much as they liked Western tanks.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$479,256	D, A	450 kg	45.5 tons	4	14	Thermal Imaging, Image Intensification, WL/IR Searchlight	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor		
126/88	25/20	1100+380	485	Trtd	T6	TF64Cp	TS25	TR16 HF80Cp HS18Sp HR10

Fire Control	Stabilization	Armament			Ammunition		
+4	Good	120mm Gun, PKT, NSVT (C)			48x120mm, 5500x.7.62mm, 800x.50		

Uralvagonzavod T-94

Country of Origin: Russia (Soviet Union)

Notes: This vehicle does not exist in real life; it is based on a rumored design for "the next Soviet main battle tank," rumors that started appearing in the late 1970s and persisted until the early 1990s. This tank is the one originally listed in *Twilight:2000* as "T-90;" I have altered the designation to take into account the appearance of the real T-90, early versions of which would have made an appearance in the *Twilight War*.

During the Cold War, it seems that there was always talk about the "next Soviet battle tank" and the amazing and powerful features it had and how un-killable it was. This was often due to incomplete information and lack of intelligence about the Soviet's tanks (and military technology in general) and sometimes disinformation put out by the Soviets themselves. It was also caused by the tendency during most of the Cold War for Western analysts to overestimate the Soviets' military technology. The Western governments during the Cold War also would often deliberately put out overestimates of Soviet technology to spur on military technology that was even better than those overestimates, and to justify high defense expenditures. (And every so often, the Soviets *did* actually come up with something that was better than the West had.) For the most part, however, Soviet military technology, and the amount of effective forces they had, lagged behind intelligence estimates, and Soviet capabilities were usually much less than Western governments publicly stated.

One of the big buzzwords in the West was about the "Future Soviet Tank" that began circulating in the late 1970s, and intensified in the early 1980s. The designers of the *Twilight 2000* game used some of these reports to devise a fictional Soviet tank called the T-90. Since it is now known that the T-90 is indeed a real tank (though nothing like GDW's T-90), I have decided to re-christen it the "T-

94." The T-94 uses a long, low hull, topped by a low, casemated turret that houses little more than the main gun, the heads of its sights, and part of the autoloader.

The T-94's crew all sit in the hull, with the driver in front left of the hull, behind the long, sloped glacis; the commander is on the right side, and the gunner slightly behind those two and in the center. Due to the design, the commander has no machinegun, though there is a small hatch on the turret roof surrounded by vision blocks that can be used by the commander or gunner if necessary for observation. The vision blocks of this hatch, however, does not have the night vision equipment that the commander's or gunner's station has. The driver has vision blocks in an arc from 30 degrees right to 100 degrees left, and the two center blocks are night vision-capable. The driver can also use a TV camera in the rear of the hull when backing up.

The primary armament of the T-94 is a modified form of the gun used by the T-80, called the 2A46-3, with the differences merely being those required for the gun and autoloader to fit inside the T-94's turret. The main gun can fire conventional ammunition as well as the 9M119 Refleks (AT-11 Sniper) laser-guided ATGM. The downside of the T-94's turret design is that the T-94's gun and coaxial machinegun is capable of almost no depression – it can manage only -1.5 degrees, but this was deemed acceptable due to the T-94's low silhouette when hull-down. (The T-94's lack of depression for its main gun was also the reason that the Soviets did not use the T-94 in mountainous regions.) The autoloader can handle any sort of ammunition the T-94 is able to fire, including the Refleks ATGM, and all main gun ammunition on the T-94 is essentially in the autoloader. The coaxial machinegun's ammunition is contained in a single container in a continuous-feed belt. The expended stub of the main gun ammunition is ejected through a small hatch on the right hull side, as is the boot-type adapter for the Refleks ATGM. The T-94's fire control system is almost unbelievable by Soviet standards, including a laser designator, a ballistic computer almost up to Western standards, excellent gun stabilization, advanced night vision and amplified day vision – and all successfully downlinked by fiberoptic cabling to LCD screens in front of the gunner and commander. The heads for these sights are on the roof of the turret, inside of armored housings, one each for the commander and gunner. The T-94 also has backup sights and vision devices in front of their positions in the hull that allow for reduced vision and fire control; the commander and gunner can also go to an auxiliary, very cramped gun control position in the turret below the aforementioned hatch as a backup. If the backup sights in the hull are used, the gunner and commander will only be able to fire the main gun and coaxial in a 30-degree arc in front of the T-94, simply because those sights cannot see in a wider arc; unfortunately, the auxiliary gunner position in the turret is quite difficult to reach from inside of the T-94, virtually requiring that the crewmember be a contortionist.

The armor suite for the T-94 is advanced, somewhere in sophistication between that of the T-80 and T-94. The glacis is very elongated and highly-sloped, causing many a shot by enemy weapons to bounce off. The turret is small, round, and low, not presenting much of a target. This small turret, however, has a surprising amount of protection. Atop the turret is mounted the Shtora-1 "soft-kill" active protection system. The Shtora-1 consists of sensors and equipment mounted atop the turret and control systems mounted inside the turret and hull; the primary controls for the Shtora-1 on the T-94 are at the commander's station. The Shtora-1 system includes an electro-optical jamming system to jam wire-guided ATGMs (on a roll of 12+ on a d20, the difficulty to the ATGM gunner is increased by one level; outstanding success indicates that the incoming missile pre-detonates before it can hit the T-94). A laser warning system is also included with the Shtora-1; when the T-94 is being lased by a laser designator, an alarm sounds inside the T-94, and a pair of smoke grenades are automatically launched to help obscure the T-94 to the laser beam. The laser warning system can also be triggered manually by the commander. The smoke grenades can also be triggered by the gunner manually if he feels it is necessary; the T-94 has six smoke grenade launchers on each side of the turret. The Shtora-1 also includes a pair of IRCM lights (one on the turret on each side of and above the main gun) that emit coded, pulsed IR beams to decoy IR-guided munitions; their effectiveness is the same as listed for the electro-optical jammer above, and both have a 360-degree range of protection, as well as 180-degrees upwards. They can also temporarily blind IR sights and image intensifiers; this is successful on a roll of 8 on a d20 for IR sights and 5 for image intensifiers. A computer is provided to tie all of this information from the Shtora-1 and other sensors together. The T-94 also has lugs for 2nd-generation Kontakt-2 ERA on the glacis and hull sides (the lugs and ERA blocks do not fit on the small turret). The T-94 is already outfitted to function as a command tank, as it comes standard with a 1kW APU and an extra medium and long-range radio; the T-94 also has a small fire-direction computer to help plot artillery, mortar, and air strikes, and is equipped with an inertial navigation system and a mapping system.

The T-94 uses a gas turbine engine that is much more reliable than that of the T-80, though it unfortunately still uses a lot of fuel. The engine and suspension of the T-94 make for a fast and agile tank, and combined with the low silhouette, make the T-94 a difficult target. The SG-1050 engine develops 1500 horsepower, and can burn diesel (meant to be the primary fuel), gasoline, jet fuel, benzene, and kerosene. Due to the fuel consumption, the T-94 has the same auxiliary fuel tank capability found on most Soviet tanks since World War 2.

Like almost all Soviet tanks, the crew accommodations of the T-94 are cramped and best-suited for small soldiers. The crew has an NBC overpressure system available with a collective NBC backup. On the turret roof there is a radiac meter along with an optical chemical sniffer to warn the crew of radiation and chemical weapon threats. Radiation protection on the T-94 is similar to that of the T-80, and is almost total proof against radiation hazards, including a neutron bomb detonation within 300 meters.

Twilight 2000 Notes: Numbers of the T-94 were never high, with only about 60 being built. The T-94 was first encountered by scout elements of the 6th Ranger Battalion in the Ukraine in 1996, and was not often seen outside of the Soviet Union, Poland, and Czechoslovakia.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$888,935	D, G, AvG,	500 kg	51.3	3	21	Thermal Imaging (G, C), Image	Shielded

A	tons	Intensification (G, C), Passive IR (D)
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Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor*					
162/114	41/26	1200+740	726	CiH	T6	TF100Cp	TS40Sp	TR30	HF200Cp	HS23Sp	HR16

Fire Control**	Stabilization	Armament	Ammunition		
+4	Good	125mm 2A46-3 Gun, PKT	34x125mm, 6xAT-11 ATGM, 3500x7.62mm		

*Armor for the hull floor and hull deck is 12; armor for the turret deck is 12Sp.

**If the auxiliary gun controls at the gunner's or commander's station are used, the Fire Control modifier is only +1.

Uralvagonzavod T-95

Country of Origin: Russia (Soviet Union)

Notes: There is possibly a real a T-95, but details of it have not yet been released, nor have pictures. (The Black Eagle and the real T-95 may in fact be the same vehicle.) At any rate, *this* is not the real-life T-95.

Twilight 2000 Notes: The T-95 tank was begun as a program to design an improved T-80/T-90 tank that would standardize the manufacturing plants, which were producing two different models. The design borrows from the T-80 MBT for its chassis; designs seen in combat were based on the T-80UM (which is equipped with Explosive Reactive Armor (ERA), a more powerful engine, better computerized fire control system, and thermal imaging systems and sights). The major difference is the addition of an automatic loading, low-profile turret that is armed with a 135mm smoothbore cannon, and is NBC-sealed.

The T-95 has been fitted with an experimental model of the T-90s Shtora-1 Countermeasure system. It is designed to detect the presence of an enemy laser beam (used for targeting); upon detection of a laser beam, it immediately launches a series of smoke charges to obscure the beam.

The T-95 was first seen in late 1994 by spy satellites of the National Reconnaissance Office, and was first seen in combat in the summer of 1997 by elements of the US 43rd Infantry Division. It is known to be capable of using the AT-11 Reflects missiles of the T-90, in addition to its normal ammunition, and a special 135mm Thermobaric (fuel-air explosive) round that was designed to be used against light armored vehicles in convoys. The T-95 has picked up the nickname of "Dragon" from NATO troops, due to its ability to cripple and kill foreign-made tank designs.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$491,803	D, G, AvG, A	500 kg	49 tons	3	17	WL/IR Searchlight, Thermal Imaging	Shielded

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor					
190/133	40/30	1200+400	844	CiH	T6	TF145Cp	TS36	TR24	HF182Cp	HS18Sp	HR12

Fire Control	Stabilization	Armament	Ammunition		
+4	Good	135mm gun, PKT, NSVT (C)	38x135mm, 5xAT-11 ATGM, 1250x7.62mm, 300x12.7mm		

Hunter Offroad MOTiV

Notes: the MOTiV was built on the base of a Chevrolet 1976 heavy-duty truck; the finished vehicle looks much more like oversized dune/Off-Road 4x4 buggy than the truck it is based on. It is a one-off, though Hunter Offroad *may* make others. (I have added a few features in the armament department from the original design, making it more T2K-ish. The MOTiV was designed as a test vehicle for the Arizona Highway Patrol; whether or not they will order others is currently unknown. (Hunter Offroad, rumor says, hopes for military sales and sales to serious offroaders.)

The new vehicle has a 350-horsepower engine, with a manual transmission. The doors, front quarter, the door pillar, the rear pillar, and the rear space have sides made from thick Kevlar; the engine compartment also has the same protection. Windows, however, are wide open. The body is surrounded by a complete roll bar package, including the passenger section, the underside, and the engine, both to provide protection and reinforcement. The suspension is raised and the front wheel track is widened to increase stability and off-road performance; it enables the MOTiV to climb steep rocky surfaces as well as large rocks and holes on the ground. At the top of the front of the rollbar cage on each side are high-intensity LED lights for use in complete darkness; conventional vehicle lights are also mounted at the front. On the front is another LED light bar using red, white, and blue elements, with an IR light bar below it. On the back is another set of red/white/blue LED lights. On the back are another pair of LED lights. On each side, about halfway down the rollbars, are IR lights for use with NODs. The tires are designed for off-road vehicles, and the wheels are aluminum alloy to decrease weight. The bumper has a winch in it, able to pull 9.5 tons, and designed to run at high speed. In the back behind the cab is a "Vehicle Blowout Kit, carrying basic tools, wheeled vehicle tools, and a small drill with a selection of drilling bits and a larger selection of screwdriver bits. A wire cutter and bolt cutter are also present. (These are included in the price of the vehicle.) The box doubles as a seat for the rear gunner. There are a plethora of racks for personal weapons, with two in the front and two in the back.

The vehicle has four padded bucket seats, with four-point harnesses. To decrease weight, much of the floor and sides is actually wire mech. (Clearly, there is no protection from mines and IEDs. The Arizona Highway Patrol did not need to worry about that.)

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$59,141	G, A	2 tons	3.74 tons	Up to 5	4	2xPassive IR NODs, Headlights, IR Headlights	Open

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
546/437	152/77	318	167	Std	W(3)	HF2 HS1 HR1

Fire Control	Stabilization	Armament	Ammunition
Nil	None	3xMAG (2 Rollbar, C), M-2HB (Rear)	2000x7.62mm, 600x.50

M648

Notes: Though based on a real proposed vehicle, the M648 does not actually exist in real life.

Twilight 2000 Notes: This vehicle is along the same lines as the M548, but built on the chassis of the Bradley and MLRS. This vehicle was developed specifically for the needs of US forces in the Gulf and delivery of them did not start until late 1995, so they are rarer than the M548. Most of them were used as ammunition carriers, especially for MLRS and LARS formations. It is believed that the only other country that received these vehicles other than the United States was Israel, and they got few of them. Like the M548, there are doors on either side of the cab, with the engine compartment to the rear of that. The cargo area is accessed by a watertight ramp. On top of the all-metal cab, there is a mount for a weapon, but no weapon is provided with the vehicle.

Price	Fuel Type	Load	Veh Wt	Crew	Mnt	Night Vision	Radiological
\$11,088	D, A	10.89 tons	14.51 tons	3+44	12	Headlights	Enclosed

Tr Mov	Com Mov	Fuel Cap	Fuel Cons	Config	Susp	Armor
152/107	36/25/4	617	185	Std	T3	HF1 HS1 HR1